CEYLON.

PART IV.—EDUCATION, SCIENCE, AND ART (D).

# Administration Report of the Acting Director of Agriculture for 1928.

*(W. SMALL, Esq.)*

**JULY, 1929.**

*Ordered by His Excellency the Governor to be Printed, June 14, 1929.*

COLOMBO:
A. C. RICHARDS, ACTING GOVERNMENT PRINTER, CEYLON.
To be purchased at the GOVERNMENT RECORD OFFICE, COLOMBO: *price 50 cents.*
1929.

CEYLON.

PART IV.—EDUCATION, SCIENCE, AND ART (D).

# Administration Report of the Acting Director of Agriculture for 1928.

*(W. SMALL, Esq.)*

**JULY, 1929.**

*Ordered by His Excellency the Governor to be Printed, June 14, 1929.*

COLOMBO :
A. C. RICHARDS, ACTING GOVERNMENT PRINTER, CEYLON.
To be purchased at the GOVERNMENT RECORD OFFICE, COLOMBO : *price 50 cents.*
1929.
[A 45/29]-13(29)29-IV-588

# DEPARTMENT OF AGRICULTURE.

## REPORT OF THE ACTING DIRECTOR OF AGRICULTURE FOR 1928.

## PART I.—AGRICULTURE IN CEYLON.

### General.

The Hon. Mr. F. A. Stockdale, C.B.E., who had been Director of Agriculture since 1916, was appointed Assistant Agricultural Adviser to the Secretary of State for the Colonies. He left Ceylon on November 21.

Climatic conditions were favourable on the whole for tea and rubber, while coconuts were affected by drought in the early part of the year in the North-Western Province and later in the Districts of Mannar and Jaffna. Paddy conditions were normal in most parts of the Island. The crop suffered from drought in the Northern and North-Central Provinces and from floods in the Southern Province and other parts. In the Province of Sabaragamuwa the yields of both the yala and maha crops were below the average. Conditions for dry-grain crops were normal on the whole, but the effects of drought were seen in the vegetable gardens of the Central Province. The rainfall of 1928 was slightly above the average in parts of the Western, Northern, Eastern, and North-Western Provinces and Sabaragamuwa, and slightly below the average in up-country districts and Mannar. On the whole, conditions of rainfall may be described as normal.

### Tea.

Exports of tea during 1928 amounted to 234,890,761 lb. of black tea and 1,828,628 lb. of green tea. These figures show an increase over the previous year in the case of black tea and a decrease in the case of green tea. The average prices per pound were lower than those obtained in 1927, despite the fact that demand for Ceylon tea was steady. Tea growing, however, remained remunerative, and it has to be recorded that the quality of the better grades of tea has been maintained at its former high level and has not failed to secure the higher prices it deserves. There is every reason to think that in the future more rather than less attention will be given to quality and to the care that is devoted to manufacture. While the coming into bearing of new areas of tea accounts for a part of the increase of the exports of 1928, continued attention to cultivation and manuring has also played a part.

On the whole, tea in Ceylon continues to present the appearance of a crop which is well cared for and is grown under favourable conditions. While losses from root and other diseases have occurred in 1928, and, while it is difficult to make a general statement to the effect that the losses were less than in previous years, it is certain that on the whole there was no increase in the losses due to disease. Climatic conditions in 1928 were less favourable to tea than in previous years, but crops were satisfactory. Activity in the building and bringing up to date of factories continued, and visitors from other tea-growing countries continued to be interested in Ceylon tea factories and factory methods.

Further attention has been directed to the question of soil erosion and great interest has been shown in systems for the prevention of wash. Particular mention may be made of the work of Mr. E. O. Felsinger and Mr. C. C. du Pré Moore, and it is desirable that other practical agriculturists should give accounts of their methods and results. Despite the wide interest in the question, the fact remains that the necessity for preventive and curative measures has not yet been realized in full and that much good land is being subjected unnecessarily to a washing-out process that is avoidable at least in part. The use of green manures or cover plants has not extended as some would wish, but it has to be remembered that the ideal cover plant for tea has not yet been found. *Indigofera endecaphylla* has been and is still recommended. It continues to give encouraging results and it is of value as an improver of the soil, but it is liable to harbour snakes, a consideration that must be taken into account. The movement towards lighter pruning has continued to gain ground, and the number of tea small-holdings has increased during the year, especially in the Central Province. The demand of small-holders for plants has led to the establishment of numerous nurseries in the Central Division and to the necessity for continued inspection of the nurseries and continued efforts to prevent dissemination of the shot-hole borer. Regulations passed during 1928 require that all nurseries which sell tea plants shall be registered and graded. The removal of plants by permit is now restricted according to the class of nursery from which the plants are sold. Nurseries are divided into five classes. Plants from nurseries of class A may be moved throughout the Island; from class B within infested areas; from class C within the revenue district in which the nurseries are situated; from class D within the chief headman's division in which the nurseries are situated. In the case of class E no movement of plants is allowed. It has also been ordered during 1928 that permits must accompany plants to their destinations and that no plants shall be accepted by the railway for transport unless they are supplied with a permit. It is hoped that these new regulations will result not only in a better control of the movement of shot-hole borer-infested plants but also in an improvement of the stock of the nurseries. The numbers of permits issued and of plants removed by permits in 1928 were respectively 1,018 and 8,373,978, both numbers showing large increases over the figures for 1927. Twenty-eight permits for 252,000 plants were refused.

It was decided in 1927 that tea Tortrix should be declared a pest, and collection and destruction of egg-masses were made compulsory from October, 1927. The returns provided by estates show that millions of egg-masses have been destroyed during 1928, and a comparison of the figures available in another twelve months with the figures already obtained will show whether the measures of destruction have had an influence on the prevalence of the pest. A year's quarterly returns from Tortrix-infested districts do not show a progressive diminution in the number of egg-masses destroyed, but it is too early to judge of the success or failure of the scheduling of Tortrix. The Entomologist of the Tea Research Institute has continued his work on the biological control of Tortrix. Interesting work on the termites of tea plants and buildings has been done by the Assistant Entomologist of the Department of Agriculture. With regard to tea termites which, it is well known, are regarded as pests of major importance, useful information concerning their bionomics, distribution, and host plants has been obtained, and control experiments in which Paris green has been used have given promising results. The fear has been expressed that the use of Paris green in living bushes may lead to the presence of arsenic in the leaf and in the made tea, but analyses made by the Government Analyst have shown conclusively that arsenic is not present in the product of Paris green-treated bushes. The Department of Agriculture is much indebted to Mr. C. T. Symons for his help in this matter. His analytical work is being continued until July 1929. In discussing the measures to be adopted against tea termites the Assistant Entomologist has laid stress on the necessity for measures of prevention of attack.

No new diseases of tea have been reported to the Department of Agriculture during 1928. Modern methods of pruning, cultivation, and manuring tend to reduce the incidence of wood rot or branch canker. Attention has been given to the problem of wood rot by the Tea Research Institute, and the Mycologist of the Institute is engaged in an investigation into tea disease and loss of bushes caused by a deficiency of food reserves in the tissues. The Mycological Division of the Department of Agriculture continued its work on root disease of tea and other plants with particular reference to *Rhizoctonia bataticola* and reached the stage of disclosing the presence of *Rhizoctonia* in small rootlets and in larger roots of apparently healthy bushes. The exact significance of these facts is not known and investigation is being continued ; the facts may prove to have a bearing on the question of the causation of root disease.

### Rubber.

The exports of rubber during 1928 were 62,374 tons valued at Rs. 80,755,062. The corresponding figures for 1927 were 60,728 tons and Rs. 129,757,640. Exported latex amounted to 683 gallons of a value of Rs. 1,559. Exports were restricted to 60 per cent. of standard production during the first ten months of the year, that is, while restriction remained in force. It was intimated in April that restriction would be removed at the end of October and the removal was awaited with a certain amount of trepidation. It was feared that a sudden rise in the amount of stocks in London would affect the market adversely, but it was found that the amount of rubber exported during the first ten months of the year was smaller than in 1927 and that the amounts consumed by America and the continent of Europe had shown an increase. Stocks accumulated in producing countries were not as large as they were expected to be, and it therefore turned out that there was no sudden rise of stocks in London and no sudden collapse of prices. London prices fell from 1/7⅞ in January to 1/1¾ in February. In April prices fell much lower and remained in the neighbourhood of 8–9*d.* until the end of the year. It is held generally that an increase in the consumption of rubber during 1929 will benefit the industry and many suggestions have been and are being considered by bodies such as the Rubber Growers' Association. Colombo prices for first quality smoked sheet fell from Rs. 1·04 in January to cents 42½ in May, and after a slight rise between June and October fell again to cents 42½ in December.

Factory preparation of sheet and crepe has continued to be of a high standard. Much attention has been devoted to the question of soil erosion, but many estates have taken no steps to conserve soil and prevent further losses. Similarly, many estates have not yet begun to use cover crops and green manures, the advantages and benefits of which appear to be obvious and to outweigh the disadvantages. A note of warning regarding the influence of cover crops on the presence and development of fungi causing root disease has been sounded by the Mycologist of the Rubber Research Scheme, and experiments in the control of the Kalutara snail which has been destructive to large areas of Vigna (*Dolichos Hosei*) under rubber are in progress. Mr. H. W. Roy Bertrand of Govinna Estate reported successful control of the snail with the use of Atlas preservative (*The Tropical Agriculturist* of September, 1928) and promising results have been obtained from the use of Bordeaux mixture. A rust of Vigna leaves, which may prove to be harmful, was found simultaneously by the Mycologists of the Department of Agriculture and the Rubber Research Scheme and is under study by the latter officer.

During 1928 money was provided from the Rubber Restriction Fund for the prosecution of budding and selection work. Steps were taken to open up an undeveloped part of the Experiment Station, Peradeniya, now known as the Iriyagama Division, and to plant it with rubber seedlings in preparation for budding and the subsequent testing of clones of budded trees for high yield. A first area of ten acres was planted, terraced and supplied with *Centrosema pubescens* as a cover plant, and two large nurseries have been laid down for multiplication of bud-wood and the supply of stocks. Further work has included the clearing, holing, and planting of another forty acres. It is hoped to make a beginning to work on Paspolakande, an area to be devoted to the testing of clones of budded rubber, and on seed gardens in 1929. The Experiment Station, Peradeniya, possesses only one plot of budded rubber which has reached the stage of testing by tapping. Tapping was commenced in May and results show that none of the clones give promise of high yields. The mother trees from which the buds were derived were not high-class yielders and, in any case, the number of trees in each clone is insufficient to provide a reliable test. No large areas of budded rubber have been put down by planters during the year, but the necessity for the selection of mother trees has been realized in part, and many estates are now keeping accurate records of high-yielding trees. In this connection, the following figures of yields of the five best trees at Heneratgoda are of interest. Bud-wood taken from these trees (and others) will be used on the Iriyagama Division.

*April 1927–March 1928.*

| No. of tree in order of merit. | Girth at 3 feet. ft. in. | Measure of cut in inches. in. | Mean no. of latex vessel rows. | Yield for 1 year. Biscuit. grammes. | Yield for 1 year. Scrap. grammes. | Equivalent in lb. Biscuit. lb. oz. | Equivalent in lb. Scrap. lb. oz. |
|---|---|---|---|---|---|---|---|
| 2 | 10 9 | 46 | 54·7 | 22,250 | 786 | 49 2 | 1 12 |
| 24 | 6 6 | 26 | 23·7 | 20,159 | 2,213 | 44 3 | 4 14 |
| 400 | 9 0 | 35½ | 41·0 | 19,840 | 663 | 43 12¾ | 1 7½ |
| 401 | 7 11 | 32 | 32·3 | 16,337 | 443 | 36 1 | 15¾ |
| 445 | 9 10 | 39½ | 28·7 | 16,101 | 410 | 35 8¾ | 14½ |

*April 1928–January 1929.*

Yield in grammes.

| | 2 | | 24 | | 400 | | 401 | | 445 | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1928. | Biscuit. | Scrap. | Biscuit. | Scrap. | Biscuit. | Scrap. | Biscuit. | Scrap. | Biscuit. | Scrap. |
| April | 1,212 | 102 | 1,167 | 192 | 1,620 | 135 | 982 | 15 | 895 | 37 |
| May | 1,234 | 100 | 1,227 | 170 | 1,319 | 53 | 1,011 | 50 | 972 | 49 |
| June | 1,060 | 75 | 1,057 | 175 | 1,104 | 68 | 960 | 50 | 865 | 45 |
| July | 1,019 | 118 | 1,000 | 119 | 1,025 | 58 | 917 | 45 | 1,002 | 80 |
| August | 1,356 | 147 | 1,248 | 140 | 1,401 | 160 | 1,158 | 50 | 1,312 | 103 |
| September | 1,223 | 145 | 1,102 | 110 | 1,357 | 92 | 1,105 | 42 | 1,212 | 58 |
| October | 1,042 | 120 | 830 | 92 | 732 | 60 | 516 | 36 | 555 | 52 |
| November | 1,220 | 166 | 1,052 | 57 | 1,535 | 105 | 997 | 42 | 1,082 | 52 |
| December | 1,311 | 138 | 1,160 | 88 | 1,498 | 140 | 1,033 | 51 | 1,140 | 65 |
| 1929. | | | | | | | | | | |
| January | 1,377 | 190 | 1,224 | 105 | 1,577 | 147 | 985 | 58 | 1,302 | 89 |

*Oidium* leaf disease has continued to cause anxiety at certain elevations. There is little doubt that continued attacks of *Oidium* are harmful and that the area affected by the fungus is larger than in previous years. It is thought that the control of *Oidium* can best be attempted by indirect means such as manuring, and experiments in manuring have been taken in hand. At the same time, efforts are being made by the Mycologist of the Rubber Research Scheme to test spraying as a method of control. Secondary or *Phytophthora* leaf-fall, in fact *Phytophthora* diseases in general, caused little or no anxiety during 1928, and there is nothing of particular interest to report regarding root disease. The scraping and isolating treatment of brown bast advocated by Mr. Mitchell of the Rubber Research Scheme and demonstrated by him on various estates has been employed with success; in fact, scraping appears to induce such a good renewal of cortical tissues that an experiment is in progress to show whether it can be employed to induce a quicker renewal of the ordinary tapped surface than occurs in certain cases.

The Physiological Botanist of the Rubber Research Scheme has devoted his time to budding and vegetative propagation of rubber on the Nivitigalakelle Station, to the rubber manuring experiment at Arapolakande, to continued work on brown bast and examination of high-yielding trees. The Chemist of the Scheme has investigated the efficiency of rubber factory machines and the results of his inquiry are in the press. Experiments have been carried out in the use of sodium silicofluoride as a coagulant, and Mr. O'Brien has shown that spots and superficial mould of crepe can be prevented by the use of paranitrophenol.

The number of subscribers to the Rubber Research Scheme at the end of 1928 was 222. The corresponding number for 1927 was 214. Local subscriptions amounted to Rs. 34,527·53 and the Scheme received the usual grants of Rs. 67,500 from the Government of Ceylon and £2,000 from the Rubber Growers' Association. The laboratories were visited by the Right Hon. W. Ormsby Gore, M.P. (Under-Secretary of State for the Colonies), Dr. A. W. Hill, C.M.G., F.R.S. (Director of the Royal Botanic Gardens, Kew), Sir Edward Rosling, Major B. J. Eaton (Chief Chemist, Rubber Research Institute of Malaya), and by many local planters. The principal problem under investigations by the officers of the Scheme in London was the cause of variation in the plasticity of plantation rubber, in connection with which attention has been given to the effects of storage under temperate conditions. A report on recent work on the effect of organic accelerators on variability is in preparation.

## COCONUTS.

The following are the figures of exports for 1928—

| | Cwt. | Valued at Rs. |
|---|---|---|
| Coconuts, fresh | 18,016,191 nuts | 1,424,287 |
| Copra | 1,976,656 | 31,801,635 |
| Desiccated coconuts | 786,703 | 19,840,117 |
| Oil | 779,112 | 19,265,529 |
| Poonac | 291,514 | 2,018,407 |
| Fibre, bristles | 182,241 | 1,527,879 |
| Fibre, mattress | 387,036 | 1,051,933 |
| Coir yarn | 92,162 | 1,635,827 |

The corresponding figures for 1927 are—

| | Cwt. | Valued at Rs. |
|---|---|---|
| Coconuts, fresh | 18,875,750 nuts | 1,515,087 |
| Copra | 1,982,154 | 31,844,823 |
| Desiccated coconut | 872,833 | 20,481,761 |
| Oil | 673,152 | 16,567,551 |
| Poonac | 173,155 | 1,241,983 |
| Fibre, bristles | 170,728 | 1,569,904 |
| Fibre, mattress | 365,121 | 1,313,404 |
| Coir yarn | 130,821 | 2,177,824 |

Fresh nuts, copra, desiccated coconut, and coir yarn show a decrease in production while coconut oil, poonac, and fibre show an increase over the figures for 1927. Prices remained steady for part of the year but showed a general decline towards the end of 1928. While the decline may be due in part to inferior preparation of coconut products for the market, it is unlikely that this reason accounts entirely for the fall of prices and it seems necessary to take into account the state of markets in Europe and elsewhere. The remedy for the present depression may well consist in a larger and cheaper production and the finding of new outlets for the produce. It is noteworthy that the amount of oil exported to India more than doubled itself during the year under review and that the amount of desiccated coconut bought by the United States of America was reduced by nearly 10,000,000 lb.

A few enterprising coconut planters have experimented with new methods of cultivation, particularly the use of green manures and mulching, but adoption of green manuring has not been general. Interesting and striking results should be available in a year or two, and those planters who are doing valuable pioneering and investigational work are to be congratulated on their enterprise and foresight. It is to be hoped that the Coconut Research Scheme will turn its attention to the investigation of the growth requirements of the coconut palm, and it is to be expected that modifications of present practice will take place in due course. A movement towards the use of both green and artificial manures has taken place among villagers in the Southern Province.

The passing into law of the Coconut Research Ordinance took place towards the end of 1928 and steps were taken at once to bring into being the Board of Management of the Scheme. It should be possible to call the Board together for its first meeting early in 1929 and the end of the year should see progress made in the establishment of the Scheme.

Investigation of the Eulophid parasite of the coconut caterpillar (*Nephantes serinopa*) has been carried out by the Entomological Division and the Plant Pest Inspector of the North-Western Division. It was proved that the parasite attacked the caterpillar during the pupal stage of the latter. Mr. de Mel also experimented with cyanogas in the control of black beetle and red weevil and found that the use of cyanogas was not practicable. The Acting Mycologist has continued his investigation of coconut root disease and has performed inoculations of palms with fungi isolated from cases of disease. As far as coconuts in the field are concerned, it may still be said that the incidence of disease of fungus origin is very small and that losses from disease are of little consequence.

### Paddy.

There has been a welcome movement among cultivators towards the improvement of methods of cultivation by weeding, transplanting, thinning and manuring, and there has also been an increase of interest in the pure-line work of the Department. The Economic Botanist has opened new central areas at Galle and Wariyapola, and the paddy seed stations in the charge of district officers now number twenty-three. The larger central areas are engaged in the initial testing of selections and the paddy seed stations in varietal trials and seed-multiplication. Progress has been made in the direction of determining a few outstanding selections and confining yield trials to them. On the whole, the maha and yala tests of selections in the divisions were very successful. The first paddy manurial experiments of real value to local cultivators have been conducted. The work is incomplete and is being continued but results already obtained are promising. Success attended the experiment of giving manures to cultivators for field trials in the North-Western Division, and it is encouraging to note that manures are being bought by co-operative societies for the use of members. Green manuring experiments at Peradeniya were not attended with success and further investigation is in hand. The Economic Botanist has also in hand a study of the flowering of paddy. An interesting development was the use in the Central Division of a paddy-threshing machine of Japanese origin. Cultivators took a great interest in the machine, and further trials are to be made in 1929.

### Cacao.

The amount of cacao exported in 1928 was 73,618 cwt. of which the value was Rs. 2,818,361. Last year's figures were 80,798 cwt. and Rs. 2,747,247. Cacao yields seem to be dependent on climatic conditions in part, and it is possible that the smaller amount exported in 1928 was due to less favourable conditions than those of the previous year. Ceylon cacao has continued to hold its high place in the market and to have great care devoted to its preparation.

### Cardamoms.

The exports of 1928 amounted to 3,337 cwt. valued at Rs. 790,349, an increase of quantity and a decrease of value in comparison with the previous year. Conditions were favourable for cardamoms, but it is not to be expected that the acreage under the crop will increase while prices continue to fall. Certain small areas of cardamoms in the Central Province have been replaced by tea.

### Citronella.

Exports of citronella oil fell from 1,358,191 lb. in 1927 to 1,200,001 lb. in 1928 and values from Rs. 1,264,745 to Rs. 1,046,598. Prices fell from Rs. 1·22 in June to about 90 cents at the end of the year. Citronella growing has suffered a set back. There is little doubt that the area under citronella is decreasing, particularly in the Southern Province which grows more than half the citronella in Ceylon. Improvement of the conditions under which the crop is grown and of the method of distilling the oil is required, and it is hoped to begin investigational work next year in the Southern Province.

### Cinnamon.

The exports of quills amounted to 34,699 cwt. of a value of Rs. 4,762,121, an increase in both production and value over the previous year. The exports of chips amounted to 11,023 cwt. of a value of Rs. 232,431. Prices were good during the year.

### FIBRES.

Exports of sisal fibre amounted to only 114 cwt. 2 qr. of a value of Rs. 1,587. 4,140 cwt. were exported in 1927. The amount of graded fibre produced on the Anuradhapura Experiment Station was 5 tons 2 cwt. 2 qr. 19 lb. Sale was effected in Colombo at Rs. 300–350 per ton of first quality. Plants were provided by the Department for cultivation at Rambewa, the village in the North-Central Province which was mentioned in last year's report, and an area has been chosen for sisal growing in the Southern Division.

Kapok to the value of Rs. 200,402 was exported during the year, the weight being 3,522 cwt. The figures for 1927 were Rs. 235,248 and 3,320 cwt. The demand for seed of Java kapok continued and every effort was made to supply it.

The export of cotton from Ceylon is of small amount, the crop being bought and used locally. The past year saw a slight increase in the area under cotton but no corresponding increase in yield owing to the ravages of elephants and adverse weather conditions. Local Cambodia seed was distributed, and yields varied from 1 cwt. to 4 cwt. per acre and averaged about 2 cwt. per acre. The quality of the cotton was not as good as that of 1927. As in previous years the crop was bought by departmental officers acting for the Spinning and Weaving Company. The price paid was Rs. 17 per cwt. at all buying points except Middeniya where Rs. 16 was paid. A reduced Government subsidy was required.

### PAPAIN.

The exports of papain again showed a large increase, the figures for 1928 being 125,684 lb. of a value of Rs. 922,529, against 83,416 lb. and Rs. 670,974 in 1927. Interest in the crop continued and more care and attention have been given to the preparation of the product.

### ARECANUTS.

There was a steady local demand for arecanuts during 1928. In the Central Province prices rose to Rs. 50 per cwt. Exports amounted to 123,338 cwt. of a value of Rs. 3,247,198.

### TOBACCO.

Exports of tobacco during 1928 were as follows :—

| | lb. | Valued at Rs. |
|---|---|---|
| Manufactured .. .. | 9,968 .. | 11,109 |
| Unmanufactured .. .. | 1,643,441 .. | 390,512 |

The tobacco crops of the Northern and Central Divisions were good. In the latter division Adcock cigarette tobacco did well at Dumbara and Nalanda.

Continued attention was given to the growing of White Burley tobacco in the Jaffna District. The officers of the Department distributed over 37,000 seedlings and 143½ oz. of seed, and the crop obtained was more than double that of 1927. The following figures show the growth of the industry between 1923 and 1928 :—

| Year. | Number of cultivators. | Production of cured leaf in lb. | Year. | Number of cultivators. | Production of cured leaf in lb. |
|---|---|---|---|---|---|
| 1923 .. | 27 .. | 801 | 1926 .. | 219 .. | 18,826 |
| 1924 .. | 66 .. | 3,864 | 1927 .. | 166 .. | 13,378 |
| 1925 .. | 268 .. | 14,131 | 1928 .. | 250 .. | 28,386 |

The cured tobacco was delivered by the cultivators at the Experiment Station and the sum of Rs. 21,133·16 was paid for 28,386 lb. The tobacco was sent to the Crown Agents for the Colonies and the sale of the first consignment realized 1*s.* 3*d.* per lb. Improvement in the curing of the tobacco is required but, on the whole, results have been encouraging.

---

## PART II.—WORK OF THE DEPARTMENT OF AGRICULTURE.

### PUBLICATION OF REPORTS.

In last year's report it was intimated that the divisional agricultural and scientific reports would be published separately in the future and so be made more easily available for distribution both to local agriculturists and to foreign exchanges, departments of agriculture and scientific institutions. The plan was duly carried out, and, in addition to the reports in English, Sinhalese and Tamil translations of parts of the reports of the Economic Botanist and the Divisional Agricultural Officer (Southern) were printed and distributed. The reports for 1928 will be published in the same way and will consist of the following: (1) report of the Mycologist on plant diseases and extracts from the reports of the Plant Pest Inspectors dealing with plant diseases ; (2) report of the Entomologist on plant pests and extracts from the reports of the Plant Pest Inspectors dealing with plant pests ; (3) report of the Agricultural Chemist ; (4) report of the Economic Botanist ; (5) report of the Manager of the Central Experiment Station, Peradeniya ; (6)–(9) reports of the Divisional Agricultural Officers of the Central, Southern, North-Western and Northern Divisions. The reports of the Systematic Botanist and the Curators of the Royal Botanic Gardens, Hakgala and Heneratgoda Gardens, are appended to this report.

### Green Manures and Cover Crops.

Reference has already been made to the extension of the use of green manures and cover crops. Much remains to be done before it can be concluded that on all or a majority of estates the maximum benefit is being derived from the use of green manure plants. The Agricultural Chemist has continued his field experiments on the decomposition of green manures and his results show that on the whole envelope-forking of green manure material into the soil tends to increase the nitrogen content of the soil to a greater extent than leaving the material on the surface. It was also determined that nitrogen was lost through the practice of leaving the loppings of green manure plants and tea prunings to dry in the field before forking in is done. The losses of nitrogen vary with different plant materials and also with the weather, alternate wet and dry conditions leading to larger losses, and it is therefore recommended that loppings and prunings should be dug into the soil before they have lost their green and fresh condition. It has also been shown that at the end of a period of drought soil which has had the loppings of green manure trees dug in contains more moisture at all depths up to 24 inches than the soil of control plots or the soil of plots with green manure trees which have not been lopped. Similar results were obtained in the case of bushy green manures. In the case of creeping green manure plants moisture was much greater in the soils of both cut and uncut green manures than in the soil of the control plots. A certain amount of variation in results indicates that soil samples must be taken from adjoining plots of the same type of soil and further determinations of moisture are to be made.

An investigation of the decomposition of green manuring material under anaerobic conditions such as hold in paddy cultivation was undertaken by the Chemist in co-operation with the Economic Botanist. The purpose of the investigation was the practical one of determining the optimum time of incorporating green manures with paddy soils. Conclusive results have not yet been attained, but it is indicated that late burying is preferable to early burying. Similarly, laboratory work on the changes of the nitrogen and humus content of paddy soils shows that the addition of green manuring material at the time of puddling the soil is preferable to the practice of manuring six weeks before puddling is done.

The Manager of the Experiment Station, Peradeniya, has continued his trial of *Indigofera endecaphylla* as a cover crop for tea. The results of the trial to date were reported in *The Tropical Agriculturist* of February, 1928, and further results and conclusions will be reported after the 1929 pruning. On April 1, 1928, an experiment was begun in the Bandaratenne rubber of the Experiment Station to show whether the cutting and forking in of Vigna twice per year affects the yield of the treated area in comparison with an uncut and unforked area of Vigna. In plot 140 A (rubber) mixed seed of *Centrosema pubescens* and *Calopogonium mucunoides* which was sown several years ago has failed to form a cover. On the other hand, *Centrosema pubescens* has made good growth on the unshaded contour terraces of the Iriyagama Division. A promising indigenous cover plant, *Dunbaria Heynei*, is under trial at the Kegalla Experiment Station of the Central Division, and the show plots of green manures and cover plants at the Experiment Station, Peradeniya, continue to attract attention.

### Soil Erosion.

The subject of soil erosion has continued to engross attention during 1928 and there has been much discussion of the merits of various systems of preventing or controlling erosion. Prevention of erosion from the time of clearing is undoubtedly the ideal to be aimed at and it is apparent from the work that has been done on certain estates that a degree of prevention which is, as it were, worth while can be attained by the adoption of systems which have been successfully tested. The question of the planting of cover crops on and the draining and the contour terracing of new clearings requires as much attention as the consideration of schemes for old tea and rubber, and it may be doubted if the necessity for preventive work on new clearings is fully realized.

The soil erosion experiment on the Experiment Station, Peradeniya, in which records of weights of soil lost are kept has been continued. The results to date show that large amounts of soil are lost but they do not indicate the superiority of one line of soil treatment over another as a preventive of wash. The experiment will be continued for several years. In the meantime, analyses of liquid samples for determination of total-solid content are in hand. It is hoped to obtain a rough estimation of the amount of soil colloids removed by the flow from the plots and also information regarding changes of constitution of the soils that may take place while erosion goes on.

### Paddy.

The paddy selection work of the Economic Botanist has been extended during 1928 by the addition of two central paddy areas at Labuduwa (Galle) and Wariyapola to those already in existence at Peradeniya and Anuradhapura. The function of the central paddy areas is the initial multiplication, testing and maintenance of purity of the selections made by the Economic Botanist, and the primary work of the paddy seed stations is seed multiplication and the conducting of varietal trials. The paddy seed stations which now number twenty-three are under the charge of the divisional and district officers. During 1928, 330 new selections were made and about 500 selections were discarded after field trials. Seed of good selections is distributed to cultivators after two field trials in a given district, but the trials are continued in the paddy seed stations in order that they may yield data on the response of the selections to seasonal variations of climate. The work at Anuradhapura was interfered with by lack of water.

The field trials of the maha season of 1927–28 and the yala season of 1928 showed that with very few exceptions the selections were superior in yield to local paddies. The results were closely scrutinized and were found to be statistically significant and not caused by chance. The divisional officers report that the cultivator is showing an increased interest in paddy field trials and a desire to acquire seed of proved selections.

The first permanent manurial trials with paddy were laid down during 1928 at Peradeniya and at Labuduwa. The first season's results are not yet available and the trials will be continued until seasonal variations can be eliminated from the results and the profitableness or otherwise of applying manures is definitely established. Sulphate of ammonia, superphosphate, potash, ammophos, steamed bone meal and green manures are being tested singly and in combination. Steamed bone meal appeared to give promising results in a preliminary experiment at Peradeniya. Two green manuring experiments were failures owing to wet weather at harvest time. Green manuring trials at Peradeniya have met with little success. The following plants have been tried: *Crotalaria anagyroides, Crotalaria juncea, Crotalaria usaramoensis, Sesbania cannabina, Desmodium gyroides, Mucuna,* and *Tithonia diversifolia.* As in previous years the paddy fly and stem borer did much damage in the field, and the paddy moth and paddy weevil in the seed store. Mole rats, crabs, and birds are also destructive and the causes of much loss.

Four Burma paddies and eight Californian paddies are under trial at Peradeniya and a study of sizes of grain and of the flowering of paddy was undertaken. A Japanese threshing machine was tried at Katugastota with encouraging results. The trials will be continued, but, in the meantime, several cultivators who saw the machine in operation have bought or ordered it. Great interest was displayed in the performance of the machine. An inquiry into the conditions of paddy cultivation in Ceylon from which useful data may be expected was begun towards the end of 1928.

The following tables give a summary of the paddy selections tested during the year in rod-row plots and a statement of the amount of seed distributed by the Economic Botanist. Selected seed is not yet available in large quantities.

Summary of Preliminary Tests in Rod-Row Plots

| Paddy area or paddy seed station. | Varietal selection. | No. of selections tested. | No. of replications. | No. of selections retained for further tests. | Percentage increase over controls of selections in column 5, &c. |
|---|---|---|---|---|---|
| | | *Maha, 1927–28.* | | | |
| Peradeniya | Hatiel | 50 | — | 19 | Initial multiplication |
| Illupadichchenai | Morungakai | 12 | 10 | 2 | 7–12 per cent. |
| | Perillavel | 13 | 10 | 6 | Over 20 per cent. |
| Kanniyai | Oddavalen (1) | 18 | 10 | 4 | do. |
| | Oddavalen (2) | 7 | 10 | 3 | do. |
| | Chellakadai | 20 | 10 | 4 | do. |
| Bandaragama | Honderawala | 12 | 10 | 4 | do. |
| Borala | Kaharamana | 19 | 10 | 7 | do. |
| Akmimana | Sulai | 10 | 10 | 3 | 3–20 per cent. |
| | Ratawi | 5 | 10 | 2 | 2 per cent. |
| Matugama | Suduhandiram | 48 | — | 17 | Initial multiplication |
| Tissamaharama | Sinnanayam | 29 | — | Nil | — |
| | Ratkarayel | 14 | — | Nil | — |

| Paddy area or paddy seed station. | Varietal selection. | No. of selections tested. | No. of replications. | No. of selections retained for further tests. | Percentage increase over controls of selections in column 5, &c. |
|---|---|---|---|---|---|
| | | *Yala, 1928.* | | | |
| Peradeniya | Florida | 6 | — | 6 | Initial multiplication |
| Paranthan | Hetadawi | 10 | — | 10 | do. |
| | Kandimurungan | 20 | — | 11 | do. |
| Matugama | Suduhandiram | 17 | — | 8 | do. |
| | Ratumadael | 21 | — | 9 | do. |
| Batapola | Samba | 50 | — | 20 | do. |
| | Dewareddiri | 50 | — | 20 | do. |
| | Madael | 20 | 10 | 10 | Over 20 per cent. |
| Nalanda | Kaluwi | 10 | 15 | 4 | 3–20 per cent. |
| Akmimana | Sulai | 3 | 10 | 3 | No increase over controls |
| | Ratawi | 2 | 10 | 2 | |
| Illupadichchenai | Chinati | 14 | 10 | 14 | Tests not reliable |
| | Pachchaiperumal | 18 | 10 | 7 | Over 20 per cent. |
| Songapaddai | Vellaiperumal | 20 | 10 | 4 | No increase shown by tests |

Statement of Seed Distributed by the Division.

| | | Bushels. | |
|---|---|---|---|
| Yala 1928: | To paddy seed stations | 43½ | |
| | To private growers | 208¾ | |
| | | | 252¼ |
| Maha 1928–29: | To paddy seed stations | 187 | |
| | To private growers | 24 | |
| | | | 211 |
| | Total | | 463¼ |

## EXPERIMENT STATIONS.

At Peradeniya the tea manurial experiment has been continued. It is hoped to consider results after the 1929 pruning. The demonstration plots of shade trees are of interest and observations have been continued on *Indigofera endecaphylla.* A trial of Pabco mulch paper in nursery beds did not prove the use of the paper to be of advantage. Mention has already been made of the soil erosion work.

The results of the old manurial experiment in rubber were published in *The Tropical Agriculturist* of July, 1928, but they should be studied in conjunction with the comments made by the Economic Botanist in *The Tropical Agriculturist* for November, 1928. There is no doubt that nitrogen gives a significant increase of yield. Other experiments in progress are a one-third resting experiment, a change-over tapping experiment, a comparison of yields of alternate-day and three-day

tapping, and a comparison of yields of alternate-day tapping throughout the year with the yields of two series of daily tappings in alternate months. The brown bast experiment of the Physiological Botanist of the Rubber Research Scheme which attempted to show whether the incidence of brown bast was governed by the cutting of the bark or by the withdrawal of latex gave inconclusive results.

A new fermenting and washing room for cacao has been provided and arrangements for the artificial drying of cacao have been made. A coffee pulping machine is now in use, and it will be possible to prepare parchment coffee and to give in the future yields and prices in terms of parchment instead of fresh or dried berries.

Fodder grass trials were concluded in July, 1928. They have given results which are to be found in full in Bulletin 84. It is worthy of note that the number of roots and cuttings of fodder grasses supplied to the public and the Department has risen from 49,480 in 1927 to 287,057 in 1928. The value of seeds and cuttings of green manures sold during 1928 was Rs. 3,411·59, a decrease of Rs. 696·66 from the previous year, which was due to the refusal of orders for *Gliricidia* cuttings which were required for the Iriyagama Division.

The Iriyagama Division has been opened for the testing of clones of budded rubber. Ten acres were contour-terraced, planted with *Centrosema pubescens* as a cover, and supplied with four plants per hole, while the clearing and planting of a further forty acres were undertaken towards the end of the year. Seedling and bud-wood nurseries were laid down. It was hoped to bud part of the planted area in 1929, but it has been found necessary to postpone the budding until 1930. The money expended on the Iriyagama Division is provided from the Rubber Restriction Fund. Steps were taken towards the acquirement of land at Paspolakande, an area which will also be devoted to the testing of clones of budded rubber.

At the Kegalla Experiment Station seventy-eight varieties of plantains have been gathered together for observations on the time taken to come into bearing and the incidence of bunchy top disease. An attendance of over three hundred cultivators and school children was secured for a field day during which the experiments and trials in hand were explained. Arecanuts, tea seed-bearers, fruits, green manure plants, and fodder grasses are grown, and a plant for the preparation of papain is in operation. An experiment in the re-conditioning of two blocks of native-owned cacao is in progress in the Katugastota District. Kurakkan, maize, sorghum, cotton, gingelly, chillies, and tomatoes did well on the new Dambulla Station where rotation experiments are in progress. Wild pig continued to cause trouble at Nalanda. Success has attended the establishment of nurseries in the Central Division for the supply of economic and other plants to villagers.

Work on the coconut trial grounds at Chilaw was continued during the year. On the Maho Dry-zone Rotation Station cotton was successfully grown. Seventy acres of land for the new Experiment Station and Farm School, Wariyapola, were acquired during the year and in June a beginning was made with the laying out of the station. A nursery of selected coconut plants has been laid down and repairs to housing accommodation, roads and fences have been effected.

Sisal, lime cultivation, and cotton rotation trials continued to form the main lines of work on the Anuradhapura Experiment Station, while attention was given to White Burley tobacco, chillies, fodders, kurakkan, and other grains at Jaffna and to cotton rotation at Vavuniya. An account of the results of sugar-cane cultivation at Allai was published during the year. The results were encouraging, but it is necessary to select with care the cane to be used for making jaggery.

Much progress has been made in the establishment of an Experiment Station and Farm School at Labuduwa in the Galle District. The land was cleaned up in part, building operations were begun, and planting of fruit trees, rubber, tea, coffee, cinnamon, and vegetables was done. Cotton manurial and rotation experiments in the Southern Division have been continued and have given useful results. The Experiment Station at Bandaragama continues to render valuable assistance to villagers in the preparation of rubber, and the demand for pineapple fruit and suckers from the Batapola Station was greater than in 1927 and so great that it has been found necessary to extend the area under pineapples.

In the Batticaloa District a citronella still has been set up and an extension of the area under citronella grass by 250 acres has been arranged. At Damana trials were made to determine the most suitable variety of citronella for the district. Over 8,000 economic and other plants were distributed from the four nursery blocks in the district. At Bibile good crops of cotton, sugar-cane, ground-nuts, maize, and other grains were raised and rotations were demonstrated to cultivators.

Efforts have been made in the Ratnapura District to encourage the cultivation of root crops and fruit trees. At Kuruwita the budded rubber which is planted on contour terraces continued to do well and at Godakawela good yields were obtained from a small plot of cacao. Cotton gave good results at Embilipitiya and the demonstrations of rotations with cotton have been of interest to cultivators.

### Dry-Zone Agriculture.

It is now possible to review the slow and patient work that has been done in various parts of the island in the rotation of crops in dry areas. It cannot be said that the work is finished and that results and conclusions are definite and applicable to all times and all conditions, but certain points of view and certain lines of work are worthy of study or adoption. Departmental work has aimed at the replacement of the shifting cultivation of the chena system by a more permanent system of agriculture and has shown that the replacement is possible, but the conditions under which the change may take place must be carefully considered and it must be realized that the change itself cannot be made in haste. The work of the Department shows that early cultivation, the keeping down of weeds, mulching, and the incorporation of green material with the soil in order to form or increase humus, the use of implements, and stumping are necessary for local permanent or continuous cultivation. The choice of both money and food crops, their rotation and their relative amounts at any given time must be considered with care, and rotation, green or cattle manuring of the land, the keeping of cattle, and the maintenance of adequate fences must be insisted upon. There is a fair choice of both food and money crops which are suited to the various dry areas, and there is little doubt that all can be grown successfully under the conditions mentioned, but it must not be forgotten that arrangements must be made for taking the produce, especially perishable produce, off the hands

of the cultivators with speed and that the well-being of cultivators and their stock must be assured. Perhaps the first step towards a more permanent system of cultivation is the granting to cultivators of larger blocks of land with a certain security of tenure, and it may be recommended that revenue officers should review the present position in the light of the above views.

## COTTON.

Weather conditions were not altogether favourable to cotton cultivation. Although the area under cotton was increased by 400 acres in the Southern Division, the crop was only 4 cwt. more than that of the previous season, the amount being 1,911¾ cwt. In other parts of the island 172 cwt. and 4½ lb. were produced. A reduced subsidy was paid in the Southern Province. In addition to the loss of crop caused by unfavourable weather conditions, the depredations of two herds of elephants caused the abandonment of a considerable acreage in one of the best cotton-growing areas of East Giruwa pattu. Cotton was purchased at Rs. 17 per cwt. at Hambantota, Ambalantota and Bata-ata, and at Rs. 16 per cwt. at Middeniya. The following figures show a deficit of Rs. 448·36 on the season's working :—

Hambantota District Cotton Purchase Scheme, 1928.

| | Rs. c. | Rs. c. |
|---|---|---|
| (1) Transport of cotton seed from ginnery to distributing centres .. | | 531 31 |
| (2) Transport of seed cotton from purchase centres to Colombo .. | | 3,527 32 |
| (3) Bagging seed cotton and transport and stitching of gunny bags .. | | 562 97 |
| (4) Bonus to Headmen at 25 cents per cwt. on 1,764 cwt. 1 qr. 19 lb. of first grade seed cotton .. .. .. .. | | 441 10 |
| (5) Travelling of officers and police escort and transporting cash boxes .. | | 1,144 51 |
| (6) Printing cash and receipt books .. .. .. | | 75 0 |
| (7) Watcher at Hambantota Customs Warehouse where cotton was stored | | 69 75 |
| (8) Transport and cleaning of unsorted cotton .. .. | | 96 24 |
| (9) Needles, painting brushes, stencil ink, twine, &c. .. .. | | 27 0 |
| (10) Transport of scales and weights .. .. .. | | 119 80 |
| (11) Value of new scales and weights (Departmental property) .. | | 822 0 |
| | | 7,417 0 |
| Paid on cotton purchase to cultivators (*vide* statement attached) .. | | 30,541 19 |
| | | 37,958 19 |
| Total value of cotton disposed of to the Ceylon Spinning and Weaving Mills Co., Ltd. .. | 34,262 83 | |
| Government grant on 1,910 cwt. at Re. 1·70 per cwt. | 3,247 0 | |
| | | 37,509 83 |
| Actual loss .. | | 448 36 |

Statement of Quantities of Cotton purchased and Amounts paid to Cultivators.

| | Hambantota. | Ambalantota. | Bata-ata. | Middeniya. |
|---|---|---|---|---|
| Date of first purchase .. .. | April 3, 4, and 5 | April 7–10 .. | April 3–6 .. | April 3–12 |
| Date of second purchase .. .. | May 26 and 27 | May 28 and 29 | May 26–28 .. | May 27–29 |
| Amount of seed cotton purchased. | cwt. qr. lb. | cwt. qr. lb. | cwt. qr. lb. | cwt. qr. lb |
| First grade, first purchase .. .. | 319 0 21 .. | 423 1 2 .. | 181 2 26 .. | 821 1 3 |
| First grade, second purchase .. .. | 1 3 22 .. | 24 2 3 .. | 1 2 13 .. | 6 2 17 |
| Second grade, first purchase .. .. | — .. | 1 3 14 .. | 5 3 25 .. | 55 1 5 |
| Second grade, second purchase .. | 25 1 3 .. | 31 2 22 .. | 3 0 23 .. | 6 0 19 |
| Total quantity purchased at each centre .. | 346 1 18 | 481 1 13 | 194 3 8 | 889 1 16 |
| | Rs. c. | Rs. c. | Rs. c. | Rs. c. |
| Total value of cotton purchased at each centre | 5,672 92 .. | 7,896 67 .. | 3,244 79 .. | 13,726 81 |
| The total value of cotton purchased was .. | 30,541 19 .. | — .. | — .. | — |

The cotton leaf-eating caterpillar was prominent in the early part of the season and the leaf-rolling caterpillar in the later part. Unfavourable conditions caused loss by shedding of bolls and squares but increased attention was paid to weeding and cultivation. It has been customary to buy cotton in the early part of April and again towards the end of May, and it seems desirable to give attention to the question of having only one purchase in order to improve the quality of the lint. Under the present system of two purchases there is room for improvement in the quality and grading of the lint offered at the first sale, for too large a proportion of it is immature.

## SUGAR-CANE.

An account of the sugar-cane experimental work at Allai was published during the year. It has been shown that good crops of virgin canes can be obtained and also good ratoon yields in the case of certain canes, and land suitable for sugar-cane is available. Facilities exist for the manufacture of jaggery only, and, since there is no great local demand for it, it seems that the next step in the development of the industry is the establishment of factories for the manufacture of white sugar, a step which requires a large amount of capital and which is not warranted at the moment. Inquiries which are being made into the system of rotating sugar-cane with paddy in Java may lead to further experimental work.

## AGRICULTURAL EDUCATION.

The educational work of Divisional Agricultural Officers and Plant Pest Inspectors has been continued in the form of lantern lectures, talks, and demonstrations. Mention may be made of the visits of villagers to Experiment Stations and of the arrangements that have been made to enable members of co-operative societies to visit Experiment Stations and see the work in hand. It is hoped that a change of outlook will be brought about by the introduction and use of the *Rural Science Handbook* compiled by Mr. Stockdale and Mr. Drieberg and that the trend of nature-teaching will become more and more agricultural. A *Handbook of School Gardening* has been compiled and is in the press.

Twelve school teachers and fourteen students of the Training Colony, Peradeniya Junction, are in training at the Farm School, Peradeniya. The number of final-year students of the Farm School, Peradeniya, was fourteen, and of first-year students ten. Special attention continues to be given to practical agriculture and to dairy work. Eight second-year and seven first-year students attended the English course at the Jaffna Farm School, and classes for farmers' sons, vernacular teachers, and headmen have been very successful and are being continued. It is hoped to open the new Farm School at Labuduwa during 1929.

In the Eastern Division, present arrangements for teaching agriculture are capable of improvement. A limited knowledge of theory is imparted, but it is essential that village schools should have at least one teacher who has gone through a course of training in agriculture. There are at present five agriculturally trained head teachers in the Badulla District and their school gardens and the knowledge possessed by their pupils reflect the training of the teachers. Nineteen Government school gardens have been benefited by the periodical inspection of the Agricultural Instructors of the Batticaloa District and during the course of the year ninety-three lectures were given on such subjects as grafting, budding and layering of limes, oranges and mangoes, the uses of implements, the cultivation of garden crops, germination of seeds, study of roots and paddy cultivation and pests. It has been reported that pupils of Government schools have a clearer understanding of lessons in nature study and elementary agriculture than pupils of assisted schools, especially where rural science is taught. The standard of rural teaching in assisted schools is capable of improvement, and more advantage might be taken of the Kopay Training School and the Farm School at Jaffna.

In the Central Division, the teaching of agriculture in the majority of vernacular schools has been continued. Instruction consists chiefly of explanations of the lessons in the junior and senior agricultural readers, lessons in elementary agriculture, and lessons in nature study for younger children.

During 1928 the work of inspection of school gardens has been reorganized. Owing to the large number of schools, it was not possible for the Inspector of School Gardens to visit each school more than once a year. Inspection is now undertaken by the Agricultural Instructors and it is hoped that two inspections per year will be possible. There are also two Vernacular Agricultural Instructors (teachers who have been given a special training at the Farm School) who teach agriculture at eight schools in the Matale and Kotmale Districts. It was necessary to dismiss the Vernacular Instructor of Kegalla and the Vernacular Instructor of Katugastota has been appointed to the Farm School, Peradeniya, as lecturer in agriculture to the teachers' class. The work done by the Matale and Kotmale Vernacular Agricultural Instructors has been satisfactory and has been appreciated both by the teachers and the pupils of the various schools. During the year a special effort has been made to establish fruit plant nurseries from which plants will be available for distribution. The nurseries have been successful in part and it is hoped to extend their numbers.

Two distributions of seeds and plants were made during the year to all registered school gardens for maha and yala planting respectively. Future distribution will be done at definite times in order to ensure the planting of seed at the right time. Paddy cultivation has been done in a number of schools with special attention to seed selection, manuring, and transplanting. Much attention has been paid to hedges and many good hedges of *Hibiscus*, Croton, and *Duranta* are now maintained in school gardens.

In the North-Western Division, practical training in the cultivation of flowers, fruits, cereals, vegetables, currystuffs, and medicinal herbs was given to the pupils daily from half to one hour in the mornings. Pupils were also encouraged to cultivate small plots with vegetables and other crops. The gardens have been inspected frequently and instruction has been given. Teachers have been requested to keep crop registers and crop returns which can be referred to during agricultural lessons. Schoolroom lessons from the junior and senior agricultural readers are given twice every week in Government schools.

In the Southern Division, twenty-three teachers in charge of schools with registered gardens are past students of the Farm School, Peradeniya. The Agricultural Instructors visit schools with registered gardens at least twice a year and they give demonstrations in the presence of the teachers, assistants, and monitors. Practical work in the garden is also carried out and the children are questioned to test their knowledge of the subject. The teachers write notes of the lessons given to their classes and the notes are examined by the officers of the Department of Agriculture and help and guidance are given when necessary. Instruction in nature study is given to all children above the second standard. The subject is taught three times a week and the period allotted to it varies from thirty minutes to one hour. Teachers are instructed that the purpose of the school garden is educational and that plants grown in the garden are to be used freely for lessons.

In the Northern Division, Government vernacular and other teachers are now able to teach elementary agricultural science through their training in rural science under the new syllabus. Other teachers have attended courses at the Jaffna Farm School. Vernacular school children visit the Farm School from time to time and receive practical lessons and demonstrations. Students from St. John's College, Achuvely School, Uduvil Girls' School, Holy Family Convent, Jaffna College, and Jaffna Central College visited the Farm School and were given instruction and demonstrations in the growing of vegetables and currystuffs in the kitchen garden, the control of common pests and diseases, the laying out of an ornamental garden, methods of grafting and budding, manures and manuring, and the uses of the agricultural implements available at the Farm School. Girl students of the senior class of the above-named Girls' Schools were given opportunities of studying by practical demonstration the analysis of milk for fat percentage, cream separation, testing of milk, budding, laying out a flower garden, bee-keeping, and poultry rearing.

### Competitions and Shows.

School and home garden competitions continued to be popular, and interest in paddy, currystuff, rubber, medicinal herb, and vegetable competitions was unabated. There is little doubt that the competitions do much to improve local standards of cultivation and that the standard of show

exhibits is improving. The following gentlemen donated prizes for agricultural and school garden competitions :—The Maha Mudaliyar (Mr. J. P. Obeyesekere), Sir S. Schneider, K.C., Mr. E. S. A. Samaranayaka, Mudaliyar M. E. Wickremaratne, Mudaliyar W. Perera, Dr. C. A. Hewavitarne, Mr. David Samaraweera, J.P., and Mr. E. S. Captain.

### SEED DISTRIBUTION.

Applications for seeds and plants during 1928 numbered 2,605, an increase of 178 over 1927. They were received from all parts of the world. Special efforts were made to supply the demand for kapok seed, both local and Java, and large imports of seed of green manures and grafted fruit plants have been made. The revenue derived from the sale of seeds and plants was Rs. 15,901·73 while free distributions amounted to Rs. 4,486·89.

### PESTS AND DISEASES.

The Mycological and Entomological Divisions have continued their advisory work during the year. The former division received 488 consignments of material for examination and report and the latter 338. There was an increase in the proportion of specimens drawn from minor and village crops to those drawn from tea, rubber and coconuts, and it has therefore been possible to devote more time to the investigation of diseases of minor products. Continued attention has been given to coconut diseases, particularly root disease, and also to diseases of paddy, though it may be said that these crops are on the whole remarkably free from fungus disease on a large scale. Special attention has been given to sclerotial disease of paddy. Investigations into the causes of root disease of woody plants with special reference to *Rhizoctonia bataticola* have brought out the interesting and probably significant facts that the fungus occurs in a mycorrhizal form in healthy rootlets of tea and that it also occurs in the larger roots of apparently healthy plants of tea and rubber. The investigations and inoculation experiments with *Rhizoctonia* are in progress. The most important piece of entomological work undertaken during the year was the investigation of the termites of tea and other plants. Much information has been acquired concerning the bionomics and distribution of the pests and the Entomological Division is now in a position to advise regarding both prevention of attack and control of the insects through destruction of the colonies. Work has been done on the control of the nettle grubs of tea and arrangements have been made to extend investigations in Uva. Further experimental work on the possible insect cause or carrier of bunchy top disease of plantains (*Pentalonia nigronervosa* Coq.) is in hand and the Eulophid parasite of the coconut caterpillar has been studied by the Entomological Division and the Plant Pest Inspector of the North-Western Division. Under certain conditions the parasite controls the caterpillar. The investigations will be extended to the Eastern Province. A considerable amount of work on pests of vegetables and the sweet potato was done.

The Plant Pest Inspectors and their staffs have continued their advisory work in the form of lectures and demonstrations and it has to be recorded that increasing interest in their efforts has been shown by the cultivator. Reference has already been made to the new regulations for the movement of tea seedlings which are intended to enforce a more rigid control over the movements of shot-hole borer-infested plants and also to the returns of the destruction of the egg-masses of tea Tortrix.

### WATER HYACINTH.

The active campaign against water hyacinth in the Southern Division was brought to a successful close in 1928. A careful watch for the re-infestation of areas which had been cleared was kept, and it was found necessary to carry out constant inspections and re-clearings. Four village tanks in the Hambantota District were cleared and the pest is regarded as under control in the Galle and Matara Districts. Great difficulty in making vel-vidanes and cultivators to realize that neglect of re-clearing operations results in a return of the pest was encountered, but the situation in the Hambantota District was greatly improved through the co-operation of the revenue officer. Swamps in the Ambalantota area proved troublesome and special measures had to be adopted in the case of the Namayalawila swamp and the Kirama river in the Tangalla area. The area of the Ranna or Urubokka river which was infested for a distance of fifteen miles was cleared in four months at a cost of Rs. 5,197·75. The total amount spent on eradication of water hyacinth in the Southern Division during 1928 was Rs. 8,268·43. In the North-Western Division much time and attention were given to eradication of water hyacinth and the campaign against the pest is being pursued with energy.

### CHEMICAL WORK.

The Agricultural Chemist has been called upon to advise on the uses, methods of treatment and decomposition of green manures, cattle manure, artificial farm-yard manure, composition of wood and other ashes, fertilizers, manuring of tea, rubber, coconuts, fruits and vegetables, essential oils, sugar-cane, tobacco, papain, annato, treatment and cultivation of soils, fodder grasses and feeding stuffs, and insecticides and weed-killers. Besides the investigations mentioned under the headings of green manures and soil erosion, the Chemist has analysed 358 samples of various products and soils and has continued his investigation of the leaching of fertilizers under local conditions. The following is a summary of results.

### AMOUNTS OF DRAINAGE.

(1) The average drainage from the uncropped pots is greater than that from the cropped pots, being about two-thirds and two-fifths of the annual rainfall respectively.

(2) The amounts of drainage from the different pots vary, being lowest from the nitrate of soda pots and highest from both superphosphate pots and the muriate of potash uncropped pot.

(3) The amount of drainage is directly correlated with the rainfall and, under certain conditions, appears to be dependent on the intensity of the latter.

(4) There is no direct relation between drainage and soil temperature.

### Composition of the Drainage Waters.

(1) Calcium oxide (lime) and nitrates are present in largest amounts, chlorine to a lesser extent, and potash in much smaller proportions in the drainage waters. No appreciable quantities of phosphoric acid or ammonia are present.

(2) The large amounts of lime and nitrate found in the drainage waters are due to the soil disturbance. The addition of nitrogenous fertilizers to the pots at the rate of 60 lb. of nitrogen per acre does not appear to have influenced either the total amounts of nitrate nitrogen or the concentrations of nitrate in the drainage waters.

(3) There are much smaller amounts of fertilizing constituents in the drainage waters from the cropped than from the uncropped pots. Towards the latter half of the year, the amounts of fertilizing constituents found in the drainage waters from the former were small.

(4) The amounts of soluble constituents in the drainage waters are almost directly proportional to the drainage and hence to the rainfall.

(5) The smallest amounts of nitrate nitrogen in the drainage waters are found in the nitrate of soda pots and the largest in the cyanamide pots.

Laboratory and field experiments on the nitrification of manures and fertilizers have led to the following conclusions :—

*A.* (1) The first period of maximum nitrification varies from the sixth to the eighth week, as found in previous experiments.

(2) High nitrification percentages are obtained in all cases. This may be the result of the optimum moisture and temperature conditions under which the experiment was carried out or of the mineralization of some of the soil humus, or the result may be due to a partial failure of the modified phenol-disulphonic acid method for nitrates adopted in this investigation,

(3) There is a secondary nitrification obtained in all cases after periods varying from the twelfth to the fourteenth week, to an even greater extent than the primary nitrification.

*B.* Field nitrification tests carried out with the more widely-used nitrogenous fertilizers and manures, though not furnishing such definite data as the laboratory experiments owing to the effect of rainfall on the amounts of nitrate in the plots at the times of sampling, gave much the same results as the latter experiments regarding the period of maximum nitrification and maximum percentages nitrified. Soils from the plots containing concentrated nitrogenous fertilizers generally showed larger amounts of nitrate in the soil each time a sampling was made. These fertilizers gave smaller nitrification percentages. The direct effects, from the nitrogen standpoint, of all fertilizers and manures do not appear to be manifest after the fourth or fifth month under the soil and climatic conditions of Peradeniya. The above conclusions are identical with those obtained from the green manure laboratory and field experiments carried out previously.

The results of analyses of Ceylon paddies, rices, and milled products were published in *The Tropical Agriculturist* of April, 1928. A field experiment which is designed to determine the amounts of nitrate present at different times in Peradeniya soils subjected to varied treatment was begun in 1928 and is in progress, and a beginning has been made to an investigation into the changes induced in the physical and chemical properties of soils of areas which are being opened and planted with rubber at Iriyagama.

### Co-operation.

This subject is dealt with in full in the report of the Joint Registrar of Co-operative Societies.

### Publications.

The following publications were issued during the year :—

*The Tropical Agriculturist*, Vols. LXX. and LXXI.
*Govikam Sangarawa*. Vol. XXIII.
*Kamat Tholil Velakkam*. Vol. XXIII.

Bulletins—No. 82, Field experiments with rubber ; No. 83, List of the fungi associated with diseases of cultivated plants in Ceylon ; No. 84, Fodder grass trials.

Leaflets Nos. 50 to 56, on land crabs in paddy fields, cinnamon, cultivation of kapok, pepper, citronella, arecanut, and cardamom.

Sinhalese leaflets Nos. 50 to 55.

Tamil leaflets Nos. 50, 53, and 55.

*Govikam Sangarawa* was issued in an enlarged form, and the form of *Kamat Tholil Velakkam* will be improved at an early date. The revenue derived from the sale of publications amounted to Rs. 20,786·91, an increase over the previous year.

### Agricultural Conference.

The Third Annual Agricultural Conference was held at Peradeniya on May 7 to 10. The following programme of papers and discussions was carried through. Attendance at the various sessions was satisfactory and discussion was interesting and keen.

### Programme of Agricultural Conference at Peradeniya, 1928.

*Monday, May 7, Morning Session, 9.30 a.m. to 12 noon.*

Opening address by His Excellency the Governor.

*Paper.*—Some problems for the Tea Research Institute, by Mr. T. Petch, B.A., B.Sc., Director, Tea Research Institute.

*Discussion on above.*—The following points submitted by various District Planters' Associations will be dealt with during the discussion on the above paper :—

*Kandy District Planters' Association.*—Branch canker (wood rot) and its connection with season of pruning, style of pruning, and shot-hole borer infection.

*Morawak Korale Planters' Association.*—(*a*) Shade trees suitable for elevations of 1,500–3,000 feet, (*b*) Fuel trees for elevations of 1,500 feet, (*c*) The relationship, if any, between boga medeloa and prevalence of shot-hole borer.

*Monday, May 7, Afternoon Session, 2 p.m. to 4.30 p.m.*

*Discussion : The Uda Hewaheta District Planters' Association.*—The relationship between manuring and callus formation in tea. This discussion will be led by Mr. P. A. Keiller.

*Papers : Manurial investigations.*—(*a*) The result of drainage and leaching trials at Peradeniya during 1927, by Mr. A. W. R. Joachim, B.Sc., A.I.C., Agricultural Chemist, Department of Agriculture.

(*b*) Experience in the use of creeping cover crops in tea cultivation with special reference to *Indigofera endecaphylla*, by Mr. T. H. Holland, Dip. Agric. (Wye), Manager, Experiment Station, Peradeniya.

*Discussion.*—The following points have been submitted for discussion :—

*Kandy District Planters' Association.*—(*a*) Chemical manures and the amounts a tea bush is able to absorb with beneficial results. (*b*) The effects of a sudden stoppage of chemical manures, more especially those used as a top dressing.

*Tuesday, May 8, Morning Session, 9.30 a.m. to 12 noon.*

*Paper.*—Soil erosion with special reference to rubber, by Mr. C. E. A. Dias.

*Discussion.*—Cover crops and green manuring in rubber cultivation. This discussion will be opened by Mr. J. Mitchell, A.R.C.S., Secretary, Rubber Research Scheme, and the following points submitted by various District Planters' Associations will be dealt with during the discussion:—

*Kelani Valley Planters' Association.*—(*a*) How is the maximum benefit from different green manures and cover crops to be secured ? (*b*) What is the optimum period of retention without rooting out the cover crops and replanting ? (*c*) The desirability or otherwise of burying leaf. (*d*) The best methods of applying artificial fertilizers to soils under cover crops.

*Kandy District Planters' Association.*—The use of artificial manures forked into the soil in the control of *Oidium*.

*Paper.*—Some notes on the budding of rubber and the transport of bud-wood, by Mr. T. H. Holland, Dip. Agric. (Wye), Manager, Experiment Station, Peradeniya.

*Tuesday, May 8, Afternoon Session, 2 p.m. to 4 p.m.*

Some notes on factory procedure and efficiency especially in reference to crepe manufacture, by Mr. T. E. H O'Brien, M.Sc., A.I.C., Chemist, Rubber Research Scheme.

Inspection of laboratories.

*Wednesday, May 9, Morning Session, 9.30 a.m. to 12 noon.*

*Paper.*—Dairy farming and breeding of stock in the Kurunegala District, by Mr. R. M. Fernando.

Discussion on cattle breeding in Ceylon.

*Paper.*—Some of the limiting factors in the improvement of paddy cultivation, by Mr. L. Lord, M.A., Economic Botanist, Department of Agriculture.

General discussion of means of improving conditions of tenure between landlord and tenant.

*Paper.*—Some aspects of food production, by Mr. H. L. de Mel, C.B.E.

*Wednesday, May 9, Afternoon Session, 2 p.m. to 4 p.m.*

Inspection of laboratories and Experiment Station, Peradeniya.

*4.30 p.m.*—Inspection of Farm School, Peradeniya.

*5.15 p.m.*—Prize giving, Farm School, Peradeniya.

*Evening 9 p.m.*—The use of the magic lantern for pest protection work, by Mr. N. K. Jardine, Plant Pest Inspector, Central.

*Thursday, May 10, Morning Session, 9.30 a.m. to 12 noon.*

*Paper.*—Investigation of root diseases of coconuts, by Mr. M. Park, A.R.C.S., Assistant Mycologist, Department of Agriculture.

*Paper.*—The marketing of produce, by Mr. G. Robert de Zoysa.

*Paper.*—Bee culture, by Mr. A. P. Goonatilleke.

*Thursday, May 10, Afternoon Session, 2 p.m. to 4 p.m.*

*Paper.*—The development of the Wanni from the point of view of the people of Jaffna, by Mr. W. P. A. Cooke M.Sc., Divisional Agricultural Officer, Northern Division.

*Paper.*—The economic development of the dry zones of the Island with special reference to the work of the Department of Agriculture on the rotation of crops, by the Director of Agriculture.

Close of conference by His Excellency the Governor.

## BOTANICAL WORK.

The report of the Systematic Botanist and the Curators of Botanic Gardens are appended. The Systematic Botanist has prepared for publication a supplementary volume of Trimen's *Flora* and progress has been made with a Flora of the Kandy District. The improvement of part of the roads in the Royal Botanic Gardens was undertaken and carried out. It is hoped to continue this much-needed work. Henaratgoda gardens continue to provide supplies of seed and budwood of high-yielding trees. Certain recommendations for improvement of the botanical work of the Department, which were made by Dr. A. W. Hill, C.M.G., F.R.S. on the occasion of a visit to Peradeniya in April, have been carried out.

## EXTENSION OF WORK OF THE DEPARTMENT.

Many of the proposals which were adopted by the Board of Agriculture and accepted by Government have been put into practice, notably the establishment of an Experiment Station and Farm School at Labuduwa, an Experiment Station at Wariyapola and several smaller stations. The Coconut Research Scheme was brought into being by the passing of the Ordinance towards the end of the year.

## EXPENDITURE.

The gross expenditure of the Department, including clerical service, stores, and stationery, during the financial year 1927–28 was as follows :—

| | Rs. | c. |
|---|---|---|
| Salaries .. .. .. | 474,316 | 85 |
| Travelling .. .. | 83,990 | 83 |
| General : Labour and Upkeep— | | |
| Peradeniya Gardens .. .. | 29,636 | 31 |
| Hakgala Gardens .. .. | 6,825 | 18 |
| Heneratgoda Gardens .. | 3,262 | 71 |
| Nuwara Eliya Gardens .. | 1,792 | 41 |
| Experiment Stations— | | |
| Peradeniya .. .. | 39,221 | 89 |
| Jaffna .. .. .. | 11,930 | 43 |
| Anuradhapura .. .. | 19,220 | 72 |
| Chilaw Coconut Trial Ground .. | 1,997 | 63 |
| Heneratgoda .. .. | 729 | 14 |
| School and Home Gardens— | | |
| Labour and upkeep .. .. | 12,560 | 61 |
| Agricultural Education— | | |
| Salaries .. .. | 18,943 | 62 |
| Lecturing fees .. .. | 1,459 | 0 |
| Incidental expenses .. .. | 10,733 | 24 |
| Labour and upkeep .. .. | 7,910 | 90 |
| Dieting of students .. .. | 7,157 | 70 |
| Co-operative Societies— | | |
| Salaries .. .. | 23,437 | 55 |
| Travelling .. .. | 25,639 | 61 |
| Incidental expenses .. .. | 625 | 89 |
| Seed Store and Publication Depôt— | | |
| Salaries .. .. | 9,426 | 73 |
| Seed distribution .. .. | 10,673 | 12 |
| Publications .. .. | 16,138 | 37 |
| Incidental expenses .. .. | 439 | 30 |
| Upkeep of Library, &c. .. .. | 14,545 | 23 |
| Prevention of plant pests and diseases .. | 10,879 | 54 |
| New Peradeniya lands .. .. | 1,988 | 97 |

| | Rs. | c. |
|---|---|---|
| Special Expenditure— | | |
| Grants in aid of Agricultural Shows and Competitions .. .. | 6,581 | 94 |
| Training of Secretaries for Co-operative Societies .. .. | 3,730 | 17 |
| Experiments and demonstrations in paddy manuring and seed selection .. | 38,004 | 82 |
| Upkeep of additional minor experiment and demonstration plots .. | 32,258 | 69 |
| Cotton experiments .. .. | 22,070 | 89 |
| Maintenance of Davie's Tree, Katugastota | 250 | 44 |
| Sugar-cane experiments .. .. | 3,789 | 69 |
| Grant to Imperial Bureau of Entomology .. | 7,500 | 0 |
| Grant to Imperial Bureau of Mycology .. | 4,500 | 0 |
| Expenditure in connection with Rubber Research Scheme .. .. | 67,500 | 0 |
| Trials with fodder grasses on patanas .. | 499 | 1 |
| Scholarships in Madras for six officers for six months each .. .. | 5,749 | 96 |
| Scholarships in Madras for higher training in agriculture .. .. | 3,625 | 0 |
| Establishment of Agricultural Station, Galle .. .. .. | 20,763 | 80 |
| Establishment of Agricultural Station, North-Western Province .. | 16,014 | 73 |
| Central Experiment Station and Agricultural School for Southern Division .. | 146,578 | 41 |
| Central Experiment Station and Agricultural School for North-Western Division .. .. .. | 57,238 | 38 |
| Requisition of the Village Committee Bungalow at Bandaragama .. | 3,850 | 0 |
| Loss on tobacco purchase scheme, Jaffna .. | 421 | 5 |
| | 1,294,082 | 23 |

The expenditure may be itemized under the following sub-heads :—

| | Rs. | c. |
|---|---|---|
| Administration .. .. .. .. | 72,524 | 55 |
| Research: scientific investigations, including Central Experiment Station .. | 473,343 | 66 |
| Botanic Gardens .. .. .. .. | 73,619 | 72 |
| Agricultural education, including School of Tropical Agriculture, Farm School, Jaffna, School Gardens, Grants to Shows and Competitions .. | 65,357 | 1 |
| Divisional experiments, including experimental cultivation of cotton and Experiment Stations in Jaffna and Anuradhapura, and other experimental plots .. .. .. .. | 513,375 | 59 |
| Co-operative Societies .. .. .. .. | 59,183 | 18 |
| Seed Store and Publication Depôt .. .. .. | 36,678 | 52 |
| | 1,294,082 | 23 |

## REVENUE.

The following is a statement of receipts for the financial year 1927–28 :—

| | | | Rs. | c. |
|---|---|---|---|---|
| (1) Sale of seeds and publications .. .. .. | | | 36,804 | 0 |
| (2) Botanic Gardens, Peradeniya .. .. .. | | | 7,686 | 0 |
| (3) Botanic Gardens, Hakgala .. .. .. | | | 1,578 | 70 |
| (4) Botanic Gardens, Heneratgoda .. .. .. | | | 481 | 85 |
| (5) Botanic Gardens, Nuwara Eliya .. .. .. | | | 85 | 0 |
| (6) Experiment Station, Peradeniya .. .. .. | | | 29,941 | 78 |
| (7) Experiment Station, Balangoda .. .. .. | | | 46 | 50 |
| (8) Experiment Station, Godakawela .. .. .. | | | 611 | 54 |
| (9) Experiment Station, Bibile .. .. .. | | | 145 | 35 |
| (10) Experiment Station, Veyangoda .. .. .. | | | 194 | 50 |
| (11) Experiment Station, Kuruwita .. .. .. | | | 27 | 22 |
| (12) Experiment Station, Batugedere .. .. .. | | | 118 | 87 |
| (13) Experiment Station, Embilipitiya .. .. .. | | | 113 | 45 |
| (14) Experiment Station, Kumbalgamuwa .. .. | | | 75 | 91 |
| (15) Northern Agricultural Division :— | Rs. | c. | | |
| Experiment Station, Jaffna .. .. | 3,962 | 28 | | |
| Experiment Station, Anuradhapura .. | 5,134 | 71 | | |
| Experiment Station, Trincomalee .. | 222 | 80 | | |
| Experiment Station, Mannar .. .. | 165 | 62 | | |
| Experiment Station, Vavuniya .. .. | 499 | 32 | | |
| Experiment Station, Killinochchi .. | 1,027 | 37 | | |
| Experiment Station, Allai .. .. | 395 | 56 | | |
| Farm School, Jaffna .. .. | 1,666 | 42 | | |
| White Burley tobacco experiments .. | 2,040 | 5 | | |
| | | | 15,114 | 13 |
| (16) Central Agricultural Division :— | Rs. | c. | | |
| Experiment Stations .. . | 835 | 63 | | |
| Farm School, Peradeniya .. .. | 14,226 | 84 | | |
| | | | 15,062 | 47 |
| (17) Southern Agricultural Division .. .. | | | 4,573 | 44 |
| (18) North-Western Agricultural Division .. | | | 859 | 80 |
| (19) Eastern Agricultural Division .. .. | | | 675 | 72 |
| | | | 114,196 | 51 |

These receipts may be itemized under the following heads and sub-heads :—

| | Rs. c. | | Rs. c. |
|---|---|---|---|
| Head 3, Fines and Forfeitures | 180 55 | Head 9, Sundries .. | 1,058 19 |
| Head 4, School Fees .. | 12,734 60 | Head 10, Miscellaneous Land Revenue .. | 69,144 35 |
| Head 5, Post and Telegraph .. | 84 48 | | |
| Head 6, Railway Receipts .. | 63 63 | | 114,196 51 |
| Head 9, Sale of Old Stores, &c. .. .. | 354 63 | | |

PRESS COMMUNIQUES.

The following press *communiques* were issued during 1928 :—

Plantain Garden Competition, Galboda, Kirigoda Korales, 1927–28.
Kalutara District School Garden Competition.
Paddy Cultivation Competition in Matale East.
Pure-line Paddy Competition.
Home Garden Competition, Deraniyagala School.
School Garden Competition in Matara District.
Bogamuwa Paddy Cultivation Competition, 1927–28.
Hiriyala Hatpattu Paddy Cultivation Competition.
Kurunegala Town Paddy Weeding Competition.
Walapone Chillie Cultivation Competition.
Home Garden Competition in Pasdun Korale West, 1927–28.
Matale North Vegetable Garden Competition, 1927–28.
Pure-line Paddy Growing Competition, 1927–28.
Vegetable Garden Competition in Harispattu.
Currystuffs Cultivation Competition, Matale District.
Competition in the Kotmale Division of the Nuwara Eliya District.
Agricultural Competition in the Southern Division.
Vegetable Garden Competition, Raigam Korale.
Agricultural Competitions in the North-Western Division.
Tea Garden Competition in Udapalata, 1927–28.
Empire Marketing Board : Fruit Intelligence Notes.
Agricultural Conference, 1928.

BOARD OF AGRICULTURE.

The Executive, Estate Products, and Food Products Committees which were elected in 1927 for a period of three years remained in office.

The Estate Products Committee met five times and discussed the following matters :—

Progress reports of the Experiment Station, Peradeniya.
Budding of rubber : Proposals for expenditure from funds available from the Rubber Restriction Fund.
Ceylon's coconut crops.
Report on manuring of coconut trial ground.
Report and results of Chilaw coconut trials.
Further consideration of the question of seed gardens for the rubber industry.
Proposals for the planting of the Iriyagama Division of the Experiment Station, Peradeniya, with budded rubber.
Consideration of tea Tortrix returns.
Appointment of members of the Committee.
Travelling expenses of members of the Board of Agriculture.
Report on Rubber Tapping Experiments, 1927.
Tea Tortrix returns.
Shot-hole borer regulations : Permits for removal of stumps and amended regulations.
Tea Termites : Report by Assistant Entomologist on his visit to America.
Rubber bud-grafting proposals.
Extension of the work of the Department.
Diseases of pineapples.
Leaf diseases of rubber.
Report on Nettle Grub and Brown Bug on tea in Uva.
The nitrification of organic manures and of tea prunings.
Losses of nitrogen from green manures and tea prunings through drying under field conditions.

The Food Products Committee met in July and discussed the following subjects :—

Further consideration of the question relating to the conditions of tenancy of paddy cultivators in the several districts.
The supplies of manure to village cultivators and what steps can be taken to provide better organization.
Reports on pure-line paddies which after careful tests have been found suitable for various districts.
Reports on tests with various types of ploughs and other implements suitable for dry lands and paddy cultivation.
Consideration of the steps which should be taken to make a full inquiry into the conditions of paddy cultivation and what course should be adopted to co-opt other gentlemen directly interested in paddy cultivation for the purpose of this inquiry.
Central depôts for the purchase of surplus paddy grown by villagers.

As a result of the deliberations an inquiry into the conditions, agricultural and other, of paddy cultivation in Ceylon was set on foot and is in progress. In this inquiry departmental officers are are being assisted by members of the Food Products Committee and other gentlemen.

### Staff Changes and Departmental Examinations.

The following officers were successful in examinations held during the year :—

*Senior Departmental.*—G. V. Wickramasekera, G. D. Austin, E. A. Pieris (Field), and A. Jayasinghe (Field).

*Junior Departmental.*—G. de Silva and T. J. Jayaratnam.

*Probationers.*—R. D. Kadramer, S. H. F. de Silva, M. A. Samarasinghe, J. A. B. Mackelvie, C. A. Vaitilingam, and E. V. Ponnuthurai.

*Vernacular Examinations : Sinhalese.*—N. Senaratne, E. T. W. Wijenayake, R. D. Kadramer, Peter de Silva, W. P. A. Cooke, P. G. Saminathan, E. V. Ponnuthurai, W. A. Samarasinghe, A. Aluvihare, T. B. Bulumulle, H. L. B. Ellegala, S. P. Fernando, C. R. Karunaratne, K. C. V. de Silva, R. V. Waidyaratne, J. A. B. Mackelvie, and S. H. F. de Silva.

*Tamil.*—E. de Alwis, D. T. J. Weerasuriya, R. D. Kadramer, N. Rasiah, S. S. Sinnathurai, G. E. J. Hulugalle, E. V. Ponnuthurai, A. Aluvihare, S. P. Fernando, A. W. Kannangara, R. C. S. Cooke, E. T. W. Wijenayake, C. N. E. J. de Mel, D. P. Peter de Silva, R. V. Waidyaratne, J. A. B. Mackelvie, S. H. F. de Silva, W. Manickam, S. C. Gunaratnam, and V. L. de Silva.

The following changes took place :—

Mr. F. A. Stockdale, C.B.E., Director of Agriculture, left for England on November 21, Dr. W. Small, M.B.E., Mycologist, acting as Director of Agriculture, and Mr. M. Park, Assistant Mycologist, acting as Mycologist.

Mr. J. I. Gnanamuttu, Office Assistant, left for Europe on June 18, and Mr. A. Visvanadhan, B.A., Chief Clerk, acted as Office Assistant.

Mr. T. H. Parsons, Curator, Botanic Gardens, left for England on January 18, Mr. J. J. Nock, Curator, Hakgala Botanic Gardens, acting at Peradeniya, and Mr. K. J. Alex Sylva acting as Curator at Hakgala.

Mr. F. P. Jepson returned to the Island on March 3, 1928. Mr. G. Harbord returned from leave on November 25, 1928.

The following appointments were made:—

*Clerical.*—Mr. P. B. Dassanayake, as Clerk, Class III., of the Divisional Agricultural Office, North-Western Division ; Mr. J. M. P. Aryaratne, Clerk, Class II., to Head Office ; Messrs. R. Sivasubramaniam, P. Thalayesingham, D. E. A. Abeyaratne, T. N. Wijeyasekere, P. L. W. de Silva, S. W. Bogahalande, and D. F. Siriwardene, as Clerks in Class III.

*Agricultural.*—Mr. H. A. Pieris as Divisional Agricultural Officer, South-Western Division ; Messrs. D. J. de Soyza and C. R. Karunaratne as Head Teachers of the Farm School, Galle, and the Farm School, Wariyapola, respectively ; Messrs. L. D. C. M. Fernando, N. Krishnapillai, T. Wijayanayake, G. A. Jayasinghe, S. B. Udurawana, A. C. Palavinayagam, G. B. Richards, W. N. Fernando, V. E. P. Gunaratne, D. B. de Silva, and H. F. Davidson, as Probationers ; Mr. K. C. V. de Silva as an Agricultural Instructor ; Mr. E. S. de S. Jayasundera as Farm School Officer, Wariyapola ; Messrs. C. Ragunathan and S. B. Yatawara as Assistants to the Registrar of Co-operative Societies ; Messrs. E. K. N. Selvadurai, R. K. Thambyah, V. Ponnuchamy, R. B. Thalakada, and H. Don Baron Gunesekere, as Inspectors of Co-operative Societies ; Mr. S. Visvanadhan as Assistant Foreman.

The following transfers were effected during 1928 :—

*Clerical.*—Mr. A. B. Chelliah to Head Office in place of Mr. R. S. Gunesekere, transferred to Kandy Kachcheri ; Mr. P. Coomaraswamy to Co-operative Office in place of Mr. A. Mandalanayagam, transferred to Colonial Stores ; Mr. A. B. Suriyadasa, transferred to Matale Kachcheri.

*Agricultural.*—Mr. E. W. Dias Bandaranayake to Colombo as Fumigatorium Inspector ; Mr. F. D. Peries to the Central Division ; Mr. T. B. Ranaraja seconded for service in the Iriyagama Division of the Experiment Station, Peradeniya ; Mr. T. V. Thamotheram to Paranthan ; Mr. T. J. Jayaratnam, Sub-Inspector, Plant Pests, to Jaffna as Agricultural Instructor ; Mr. C. A. Vaitilingam to Chenkaladi ; Mr. R. P. Kadramer to Kalmunai ; Mr. C. W. de Alwis to Anuradhapura.

### Conclusion.

It is certain that Mr. F. A. Stockdale, who was Director of Agriculture from the beginning of the year under review until he left Ceylon on November 21, would wish to thank all members of the staff for their work and co-operation, and the writer of this report wishes to thank them for their helpfulness during the remainder of 1928.

Peradeniya, April 2, 1929.

W. SMALL,
Acting Director.

## REPORT OF THE DIVISION OF SYSTEMATIC BOTANY, 1928.

### General.

Mr. J. E. Senaratne joined the division on July 2, as Acting Assistant in Systematic Botany in place of Mr. E. J. Livera. Provision was made in the 1928–29 vote for preparers to poison and mount specimens for the Herbarium.

The building formerly occupied by the library was taken over and the Herbarium was transferred to it. The floor formerly occupied by the Herbarium will be assigned to the Museum.

### Herbarium.

The botanical specimens sent in for identification numbered 342. 189 specimens were sent to Kew for determination. 4 packets of seeds were also sent to Kew. 43 specimens were sent to the Imperial Forestry Institute. Some specimens of plants were sent to the British Museum for determination. 64 specimens were sent to the Royal Botanic Garden, Calcutta. Specimens of

" scented geranium " were sent to the Government Systematic Botanist, Coimbatore, for identification. Seeds of *Crotalaria ferruginea* were sent to the Botanic Gardens, Buitenzorg. 39 specimens of woody plants were sent to the Director of the Arnold Arboretum, Jamaica Plain, United States of America, and 97 specimens were received from him in exchange. 328 duplicate specimens were sent to E. D. Merrill, University of California, Berkeley, California, and 292 duplicates were received from him in exchange. Seeds of species of *Osbeckia*, *Geniosperum* and *Exacum* were sent to Kew. Materials of four varieties of pepper were sent to the University College, Colombo, for analytical study. A collection of 116 packets of mosses was received from H. N. Dixon, Northampton.

Visits were made by the staff to the following places :—Kurunegala, Nuwara Eliya, Madugoda, Veragamtota, Dambulla, Kandy, Ratnapura, Muppane, Rangalla, Kalugammana, Gampaha, Hatton, Katugastota, Galle, Nawalapitiya, Negombo, Katunayake, Kegalla, Dambatenne, Pitakande, Beraliya and Hiniduma forests, Galle, Ambalangoda, Kitulgala, Variyagala, and Ellamulle.

The economic possibilities of the wild varieties of cinnamon were studied, and *Peni-*, *Rasa-*, *Pat-* or *Ma-pat-kurundu*, the variety cultivated in Ceylon, was found wild near Kitulgala. *Naga-*, *Panni-miris-*, and *Pengiri-kurundu* are the most strongly-flavoured of the varieties found wild. *Val-*, *Veli-*, *Sevel-*, *Kahata-* and *Mal-kurundu* are inferior.

Cinnamon seeds from Negombo were collected for the Experiment Station at Labuduwa. A bottle of latex of *Antiaris toxicaria* was collected from near Kurunegala and sent to America for analytical study.

Seeds of *Indigofera stachyodes*, *Tephrosia senticosa*, *T. tinctoria* and plants of *Dunbaria Henyei* were sent to the Experiment Station, Peradeniya, for trial as green manure plants.

A large number of seeds and plants were sent to the Curator for the Royal Botanic Garden, Peradeniya. Among these were the following :—*Anisochilus velutinus*, *Antiaris toxicaria*, *Apama siliquosa*, *Calamus rotang*, *Canavalia ensiformis*, *C. virosa*, *Capparis* sp., *Caralluma campanulata*, *Cassia bicapsularis*, *Cassia marginata*, *Citrus Hystrix*, *Coleus* sp., *Crotalaria nana*, *Gynura lycopersicifolia*, *Hewittia sublobata* (*H. bicolor*), *Indigofera stachyodes*, *Klugia zeylanica*, *Lagenandra lancifolia*, *Lawsonia inermis*, *Lettsomia hancorniaefolia*, *Lucuma? Palmeri*, *Paspalidium punctatum*, *Plectranthus coleoides*, *P. tuberosus*, *Podochilus saxatilis*, *Tephrosia tinctoria*, *Trichadenia zeylanica*, *Verbena* sp., and *Zanonia indica*.

279 sheets were added to the general herbarium, 602 sheets to the Ceylon herbarium, and 226 sheets to the garden herbarium.

The manuscript of the supplement to Trimen's *Flora* was completed and sent to the publishers and progress has been made with the *Flora* of the Kandy District.

### MUSEUM.

215 seed specimens were collected for the show tins. 36 specimens of seeds and medicinal plants were replaced by new specimens. 105 specimens were poisoned. 170 labels were printed. 30 rattan canes were dried and polished. 7 varieties of bamboo were polished. Exhibits in 600 bottles were arranged alphabetically. 5 varieties of fruits were preserved in formalin. 3 bundles of fibre were received from the Experiment Station, Bata-ata. 7 varieties of coffee and 2 Michie-Golledge tapping knives were received from the Manager, Experiment Station, Peradeniya. 13 wood specimens were received from the Forest Department. 1 freak cocoa pod, 4 samples of wax, and 3 samples of cotton spun from Ceylon-grown cotton from the Hambantota District were added to the exhibits. 12 photographs of the work with sisal hemp at Mahaillupallama Estate, North-Central Province, presented by Mr. C. F. Hutchinson, were hung in the Museum.

A. H. G. ALSTON,
Systematic Botanist.

---

## REPORT OF THE CURATOR, ROYAL BOTANIC GARDENS, PERADENIYA, 1928.

Progress in the upkeep and improvement of the gardens has been steadily continued throughout the year. The garden labour attendance has been more regular and satisfactory than hitherto and all routine operations have consequently been kept well in hand. The gardens' water service has been satisfactory throughout to the benefit of all new plantings undertaken in the various collections. The arboretum, conifer, and palm collections have been extended according to the requirements of the new plants received and put out, and the general appearance of the *Canna* beds and borders has been improved. Alterations and improvements to the lake in the South Garden are in hand and all weeds and paths throughout the gardens are receiving special attention in the direction of remetalling and tarring.

### ARBORETUM.

Improvement in this area, comprising some 60 acres, continues. Attention has been given to more frequent cutting of the grass areas, to levelling of small hillocks, and to eradication of the commoner weeds, chiefly the elephant's foot (*Elephantopus scaber*) and the sensitive plant (*Mimosa pudica*).

The new plantings mentioned in last year's report are thriving and few have been lost in spite of the drought of February and March. *Bauhinia Blakeana* Dunn has flowered and is a useful acquisition. Further new plantings were put out this year comprising useful introductions and re-introductions. Sectional maps of this area are in progress, and the card index, till last year in skeleton outline, is being amplified and details of the plants indicated.

### PALMETUM.

The new introductions of which plantings were made last year suffered from the drought, the new plants of *Washingtonia sonora*, *Erythea armata*, and *Corypha alata* being lost among others.

The alterations consequent upon the removal of the old Talipot Avenue were completed in January last and an avenue of Talipot seeds was sown *in situ* in prepared beds 30 feet apart in the previous month. These have germinated well and are making headway, the seedlings being of uniform size, and to date no gaps have occurred.

### Pinetum.

A considerable extension to this group of plants has been made possible by the demolition of the old condemned bungalow formerly occupied by the Chief Clerk. A large amount of labour was required in digging out the bungalow foundations and in smoothing out the terraced compounds to allow the area to be brought in alignment with the surrounding undulations of the existing old Pinetum. The whole of the work was completed by December last and the area turfed over and 62 holes dug and the bottoms dynamited in preparation for new plantings. The latter was undertaken with the December rains and included the following interesting species among the 62 plants put out : *Juniperus procera* Hochst., the African pencil cedar, *Agathis robusta* B. and HK. f., the Queensland Kauri pine, *Cupressus macrocarpa* Hartw., and *C. Knightiana* Perry, the Monterey and Knight's cypress respectively, *Frenula* (*Callitris*) *rhomboidea* R. B., a valuable timber, *Pinus Merkesii* Jungh., a new species and a valuable resinous timber of the Shan States, Sumatra, and Burma and obtained from the Conservator of Forests, Sumatra, *Thuya orientalis var.*, *Araucaria imbricata* and *A. Bidwillii* Hook., the Bunya Bunya pine of Queensland.

This area faces the main road, is part of the gardens frontage, and now rises with undulations to the South Garden Hill. The slopes, when later carpeted with grass and well-grown conifers, should add much to the attractiveness of this portion of the frontage.

### Floriculture.

Improvements to the flower garden section continue and a large amount of labour in proportion to other sections is now entailed in keeping this up to standard.

The pergola for climbers in becoming well furnished, the more woody climbers having made strong headway, but the more tender climbers of weaker growth rather lag behind in the initial stages, and uniformity of covering has to date not been attained. The roses transferred to the long border last year show improved growth and flower much more freely. In consequence material is available for raising stocks in the nursery, and the sale of rooted rose cuttings has recommenced. Two beds have been planted up with the ground orchid *Spathoglottis plicata*, the mauve and white forms, and should later present a good show ; whilst *Plumbago capensis*, white and blue, *Begonia Bismarkii*, *Amaryllis*, Mrs. Garfield's *Celosia plumosa*, and others continue as the basis of an all-the-year arrangement of colour. New varieties of Cannas have also been utilized here, and the tree Dahlias have again flowered well. The Octagon House houses many interesting species and the *Achimenes*, recently supplemented by new sorts brought from England, has maintained its attractiveness. The orchid collection has been improved by the addition of the yellow variety of the ground orchid, *Spathiglottis aurea*, and by the addition of new Cattleyas, Laelia-Cattleyas, Brasso-Laelias, Brasso-Cattleyas and Brasso-Laelio-Cattleyas obtained and brought out this year from Messrs. Sanders, St. Albans, England.

### Roads and Paths.

Much improvement in the upkeep of roads and paths is perceptible, a special vote having been allotted for this work with a view to the remetalling of the roads throughout the gardens and metalling and tarring of all paths. There is approximately 4½ miles of 13 feet roads or drives and 1½ miles of 5 feet to 6 feet paths in the gardens, and a small additional annual vote purely for this purpose, anticipated to be completed in four years, was asked for and sanctioned, beginning with the financial year, 1927–28. To date some 2,385 yards or 1⅓ miles of road been have metalled, and 1,040 yards or three-fifths of a mile of path has been metalled and tarred or is about to be tarred, some 440 yards being already tarred and 600 yards to be tarred with the advent of the dry season in February next.

The improvement consequent upon the metalling is most noticeable, as the opportunity is taken when feasible of brick edging the roads thus metalled. Some 575 yards of road have been edged on both sides to date with the elimination of the old unsightly side drains.

### New Improvements.

The two major operations undertaken in the scheme of new improvements have been the clearing away of the condemned bungalow along the frontage already mentioned under Pinetum and the development of the area, and the thorough overhauling and re-arrangement of the South Garden lake.

The latter has involved much labour and material but a vast improvement to the lake and the surrounding area has resulted. Most of the mud was removed and utilized to form a ledge along the inside of the bank and for widening the bund on the west side. The root stocks of the water plants required for a later replanting were transferred to the small pond, the remainder, largely the lotus lily (*Nelumbium speciosum*), being destroyed. Twenty-nine large beds, 5 feet square, of stone pointed with cement were erected in the lake for subsequent planting of *Victoria regia*, selected Nymphaeas, &c., and the beds were prepared for planting. The greater portion of the banks and ledges were well turfed and pegged down and the drive on the east side of the lake was widened. The path round the pond from the bamboo clump to beginning of the new Talipot avenue was also levelled and re-made.

### Propagation.

1. *Fruits.*—The new fruit trees planted out in the new fruit plot last year suffered during the dry hot months of February and March and many casualties occurred, three varieties of the loquat, three of the grape fruit and five of the avocado pear plants having died. The tangelo and hybrid strawberry-guava have however survived and all gaps have this year been filled with the choicer types of fruits of our own buddings.

The budding of citrus, principally grape fruit, orange, mandarin and lime, has been most satisfactory in operation, but root disease, identified by the Government Mycologist as caused by *Rhizoctonia bataticola*, citrus canker and mildew, but chiefly the former, resulted in large losses to the newly-budded plants in April to May and again in October to November, several hundreds of budded plants being lost. The choice of stock was chiefly pumelo and Seville orange, both strong and robust

growers and hitherto considered the best for the purpose, but both failed to survive in any quantity the attacks of root disease. A few stocks of other citrus species and varieties notably citron, lemon, and nattaran, under experiment however survived the above periods remarkably well but were not entirely immune, and further supplies of these are now being raised and budded. Excessive rainfall during the monsoon periods appears to be a contributory cause of the losses and prepared beds under cadjan covers are being erected in the nursery to remedy this to some extent, and a section of the river bank area with soil of an excessive sandy nature and consequently well drained, is also being utilized for trial with all types of stock.

Budded plants sold or disposed of to various Experiment Stations in the Island included orange (chiefly Washington Navel), grape fruits, seedless lime, mandarin, a few mangoes, and a superior type of avocado pear.

Layered or gootee fruits include mangosteen, sapodilla, guava, litchi, lovi-lovi, &c., and inarched fruits include mangoes and loquat. Buddings of the up-country cherimoya, undoubtedly the best of the soursop group, have been successfully made on stocks of the ordinary soursop and custard apple, and it is possible this fruit may under these circumstances bear at lower elevations.

The difficulty of obtaining sufficient supplies of budwood still exists but is being gradually overcome as new sources of supply become available.

2. *Chaulmoogra.*—The raising of stocks of chaulmoogra oil plants for experiment and supply has developed considerably since the last report and plants of six different species are in stock for the purpose. Of the seed of *Hydnocarpus Wightiana* received at the end of last year from Calcutta 400 plants are in stock in bamboo pots. The small consignment of *Hydnocarpus Woodii* received from Sandakan mostly failed to germinate but 10 plants were successfully established in bamboo pots. These are being utilized as the stock plants on which to graft *Hydnocarpus anthelmintica* and *Hydnocarpus Wightiana* with a view to inducing an earlier fruiting of these species. Other seed of *Hydnocarpus Wightiana* was received in June of this year from Calcutta and of this consignment 200 plants are in bamboo pots and a few remain in beds. Seed of *Taraktogenos Kurzii* received from the Conservator of Forests, Rangoon, in September last germinated quickly and 700 seedlings have been established in bamboo pots, whilst 450 remain in beds.

Seed of the garden chaulmoogra trees was collected and 120 plants of *Hydnocarpus anthelmintica* raised and potted, whilst 250 seedlings of *Hydnocarpus venenata* and 300 seedlings of *Hydnocarpus heterophylla* have also been established in bamboo pots for use as stock plants to *Hydnocarpus anthelmintica* and *Hydnocarpus Wightiana*. Experience to date on the use of these stocks on the *Hydnocarpus anthelmintica* tree in section F shows progress to be very slow, the graftings made in June last not having successfully united at the end of the year.

A summary of the stocks in hand in nursery, in pots, and beds is as follows :—

| | | | |
|---|---|---|---|
| *Taraktogenos Kurzii* .. | 1,150 seedlings | *H. venenata* .. | 250 seedlings |
| *Hydnocarpus Wightiana* .. | 600 seedlings | *H. anthelmintica* .. | 120 seedlings |
| *H. heterophylla* .. | 300 seedlings | *H. Woodii* .. | 10 seedlings |

In addition to the above, 21 seedlings of *H. Wightiana* were sent to the E. S. P. in April last, 54 seedlings of *H. anthelmintica* and 35 seedlings of *Taraktogenos Kurzii* were sent to Heneratgoda Botanic Gardens in May and December respectively, 150 seedlings of *Hydnocarpus Wightiana* were sent to the Superintendent, Etnawalla, Ambepussa (George Steuart and Company) in May last and 1 lb. of seed of *H. anthelmintica* was sent to Messrs. George Steuart and Company in June.

3. *Rubber.*—In accordance with instructions received from the Director of Agriculture, buddings from the high yielders of Heneratgoda have been made on all available seedlings in the economic nursery with the object of multiplying bud-wood to relieve the heavy demands made on Heneratgoda supplies. The work has been interesting, the budded plants comprising the heaviest yielders of all plantations at Heneratgoda. To date 152 budded plants of 26 trees show growth of scion ranging from 1 foot to 8 feet in height and comprise the following heavy yielders.

Plantation No. 1.
No. 2 tree .. 9 budded plants
No. 24 tree .. 8 budded plants
No. 9 tree .. 7 budded plants

Plantation No. 2.
No. 140 tree .. 2 budded plants
No. 203 tree .. 8 budded plants
No. 85 tree .. 3 budded plants
No. 249 tree .. 4 budded plants

Plantation No. 3.
No. 400 tree .. 5 budded plants
No. 401 tree .. 3 budded plants
No. 445 tree .. 6 budded plants
No. 440 tree .. 2 budded plants
No. 439 tree .. 9 budded plants
No. 362 tree .. 9 budded plants
No. 355 tree .. 14 budded plants
No. 441 tree .. 13 budded plants

Plantation No. 3—*contd.*
No. 471 tree .. 2 budded plants
No. 455 tree .. 9 budded plants
No. 464 tree .. 2 budded plants

Plantation No. 4.
No. 75 tree .. 3 budded plants
No. 82 tree .. 13 budded plants
No. 71 tree .. 3 budded plants

Plantation No. 5.
No. 47 tree .. 8 budded plants
No. 48 tree .. 4 budded plants

Plantation No. 6.
No. 26 tree .. 2 budded plants

Progeny No. 2.
Tree No. 24 .. 5 budded plants
Tree No. 72 .. 9 budded plants

Further buddings of the kinds enumerated above have been made to supplement these, but as they are still dormant, they have not been included in the list and more buddings are being made as bud-wood becomes available.

GENERAL.

1. A number of new and interesting plants, bulbs, and seeds was selected and obtained at Kew and elsewhere for the Peradeniya collection and brought back in wardian cases by the Curator on his return from leave in October. The new orchids have already been mentioned, and among the other new plants obtained was a remarkably fine variety of *Pentas*, a pink *Poinsettia*, six new Ixoras, four Bougainvilleas, two new Aralias, Clerodendrons and Anthuriums, and a collection of *Nepenthes*, *Zephyranthes*, *Achimenes*, and *Hippeastrum*, &c. Hydrangeas, *Chirita*, *Exacum*, Begonias, and others were also brought out and sent to Hakgala.

2. The rubber seed crop for 1928 was generally a fair one, a total of 274,300 seeds having been collected and disposed of, realizing a sum of Rs. 2,258·13. Seed of group 1 was poor in quality but fair in quantity, total of 143,350 seed of this grade being received and disposed of. Group II. was poor in quality also but quantities were sufficient for demands, 67,950 being received and disposed of. Group III. seed was plentiful but a considerable reduction in demand for this grade of seed was noticeable, only 63,000 being required, and this amount only was collected and disposed of. The totals and amounts received show a large drop against last year when 1,152,600 seed was disposed of, realizing Rs. 6,889·50.

3. The new Talipot avenue mentioned in last report is now well established, the seed sown *in situ* having germinated well and having now been thinned out to one plant per bed. The avenue comprises eleven plants on each side, the spacing between plants being 30 feet and the distance between rows 50 feet. For purposes of record it should be mentioned that the parents of the new avenue plants were the trees of the old avenue which flowered in July, 1926, and ripened seed in December, 1927. The actual planting of the seed *in situ* was made on December 18, 1927.

4. Eight camphor plants (*Cinnamomum camphora*) raised from seed received from Mauritius in July, 1927, have been planted out, five in the South Garden near the tennis court and three in the Spice Grove, whilst six were sent to Hakgala for trial. The parent trees of this seed yield no solid camphor under Mauritius conditions, and the seedlings now raised are being tried under Ceylon conditions to ascertain the effect of soil or climate or both upon the production of solid camphor.

Six plants also were in this respect received from Mauritius in April of this year of which three are from oil-yielding parents, and three from solid camphor-yielding parents. The later consignment has also been planted out in the Spice Grove and particularly labelled and recorded.

5. A new potting shed and a wire netting enclosure for storing budded and grafted plants have been erected in the Economic Nursery.

6. The Davies' tree site at Katugastota has been regularly inspected and the area continues in improvement. Further seed of the Madras Thorn has latterly been sown in an endeavour to raise a suitable hedge to stand the dry and exposed conditions here experienced.

7. The carpenter's shed formerly situated in the Spice Garden was in consequence of improvements to the spice area removed and re-erected on the south side of the muster ground below the Curator's office. The old site was tidied up and utilized for a much-needed extension of the present spice grove.

8. Seeds of the Talipot palm near the main gates were sent to 75 botanic gardens and other institutions during February last.

9. Dr. A. W. Hill, Director of the Royal Botanic Gardens, Kew, and His Excellency the Governor visited the gardens on March 30, and were taken round by the Director and Acting Curator.

10. Mr. T. W. Taylor, Assistant Curator, Royal Botanic Gardens, Kew, arrived at Peradeniya on February 17, having previously visited the botanic gardens at Buitenzorg, Singapore, &c. Mr. Taylor stayed at Peradeniya for six days during which time a thorough exploration of the gardens was made. Desiderata lists of Kew and Peradeniya were exchanged, and the Curator whilst on leave in England visited Kew in this respect.

## OFFICE.

The card indexing of the gardens continues as time permits and much time and attention is now required to bring and to keep this up to date. The volume of correspondence with the public, local and foreign, as well as on Departmental routine, has now become very heavy, and occupies the greater part of the Curator's time.

The letter register shows the amount of correspondence to be: inward 6,425, outward 5,265.

## VISITORS.

The number of visitors, mostly from abroad, who signed the visitors' book during 1928 was 2,420.

## SALE OF PLANTS AND SEEDS.

The amount realized and credited to revenue for sale of plants and seeds from Peradeniya for the calendar year and including receipts of rubber seed from Heneratgoda was Rs. 6,392·05. The decrease on last year's receipts of Rs. 10,688·60 is accounted for in the reduced receipts on sale of rubber seed, the latter having realized only Rs. 2,258·13 against last year's Rs. 6.532·50. The value of plants and seeds issued in exchange and free issues to Government institutions, &c., amounted to Rs. 1,629·05. Value of seed, plants and cuttings issued free to school gardens for the calendar year amounted to Rs. 939·60.

## METEOROLOGICAL.

The following is the rainfall for the year together with the average rainfall for the past forty-five years. The heaviest rainfall in any 24 hours was 5·20 in. on July 7. With the exception of February and March the rainfall has been fairly well distributed.

*Rainfall for 1928.*

| Month. | 1928. | | Average for 45 years. | |
|---|---|---|---|---|
| | Inches. | Days. | Inches. | Days. |
| January | 7·06 | 8 | 3·96 | 7 |
| February | 2·86 | 5 | 1·82 | 4 |
| March | 2·67 | 8 | 4·78 | 8 |
| April | 15·37 | 18 | 8·02 | 13 |
| May | 4·28 | 8 | 6·36 | 11 |
| June | 7·14 | 21 | 10·35 | 19 |
| July | 12·32 | 17 | 8·26 | 19 |
| August | 8·37 | 21 | 6·38 | 16 |
| September | 3·70 | 11 | 6·98 | 15 |
| October | 15·01 | 26 | 13·25 | 19 |
| November | 7·15 | 23 | 10·86 | 17 |
| December | 7·93 | 16 | 8·32 | 12 |
| | 93·86 | 182 | 89·34 | 160 |

## HENERATGODA GARDENS.

The Assistant Curator, Heneratgoda, reports as follows :—

The general upkeep of the gardens has been well maintained during the year under review. The various collections received regular attention and several important additions have been made.

*Mango Plot.*—Owing to the poor nature of the soil conditions in this area the grafted plants set out in 1922 did not come up to expectation. These usually suffer from the effects of periodical droughts and are also susceptible to the ravages of caterpillar pests. All plants have been given liberal quantities of farmyard manure, leaf mould and wood ash, in two feet trenches dug around each individual plant.

*Drives and Paths.*—The portion of the circular drive at the south end of the garden which is periodically subject to inundations was raised by one foot for a length of 200 ft. with the surplus soil excavated from the mango plot.

*Fernery.*—All beds and rockeries were thoroughly renovated and several indigenous ferns and orchids were added to the collections. Four *Licuala grandis* of fair size were planted in selected spots.

*Flower Garden.*—This section has been maintained in good order and several improvements and alterations effected. Owing to the unhealthy condition of rose plants, probably due to full exposure to the sun, these were transferred into pots. The vacant beds have been planted with a choice selection of annuals. The row of specimen flowering climbers has been improved by the addition of three more varieties of *Bougainvillea* and a plant each of *Thunbergia coccinea, T. Wightiana, T. Mysorensis, Odontadenia Harrisii* and *Bignonia Smithii.* Several of the Croton plants in the collection having become too vigorous in growth had to be pruned down to encourage a bushy form, and six new varieties were added to the collection. The collection of orchids is being steadily improved and the plants are becoming matured and acclimatized.

*Araucaria Avenue.*—The cross road from the circular drive joining the main drive near the original Hevea plot was cleared of some of the over-hanging branches, and rows of *Araucaria imbricata* received from Hakgala Botanic gardens were planted. The avenue ends at the entrance to the Fernery.

*Cultivation of Chaulmoogra.*—Fifty healthy seedlings of *Hydnocarpus anthelmintica* were set out in well-prepared holes in the lower part of the *Taraktogenos* plot. A good many plants of *Hydnocarpus Wightiana* were damaged by a leaf-eating caterpillar (*Cirrochroa* sp. *?*) and the red borer (*Zeuzera coffeae*). The pests were effectively kept under control by hand-picking and subsequent sprayings of Mc'Dougall's superarsenate of lead. Of the two species of Chaulmoogra plants, viz., *Taraktogenos Kurzii* planted in September, 1926, and *Hydnocrpus Wightiana* planted in June, 1927, the latter appears to be more vigorous in growth and has made more headway than the former. The average height of *Taraktogenos Kurzii* is three feet, the largest being eight feet. The average height of *Hydnocarpus Wightiana* is five feet, the largest being eight feet.

*Tapping Experiments* of Hevea rubber started in April, 1927, for the purpose of ascertaining the best yielders were completed in March, 1928. The best 100 trees of the 464 tapped were selected for further experimental tapping.

*Bud-wood.*—1,371 feet and 155 feet of bud-wood from determined high yielders were supplied to Experiment Stations of the Department and private estates respectively. The 48 Hevea trees that have so far proved to be the best yielders were pollarded to encourage the development of bud-wood.

*Coconut Trial Plot.*—During July and November the whole plot was inundated by the overflow of the adjoining stream and was in that state for over three weeks on each occasion. With the subsiding of the floods all ridges were given liberal applications of wood ash and leaf mould, and in addition each plant was given 2 lbs. of nitrate of soda.

### Introductions.

The following were introduced and planted in their respective sections :—

*Orchids : Bletia hyacinthina, Cypripediun (Paphiopedilum) callosum, C. adratus, C. Ashburtoniae, Stanhopea ecornata,* and *Epidendrum stamfordianum.*

*Ornamental : Parkia filicoides, Cleistanthus collinus, Cassia bicapsularis, Araucaria imbricata, Calliandra Guildingii, Clerodendron fallax* and *Napoleona imperialis.*

*Ornamental Climbers : Bougainvillea sanderiana, B.* "Maharaja of Mysore" and *B.* sp., *Thunbergia mysorensis, T. Wightiana, T. cococinea,* and *Odontadenia Harrisii.*

*Spices : Pimenta acris, P. officinalis,* Cardamomum, Malabar var., and *Piper Cubebs.*

*Oil : Kokoona zeylanica.*

### Notes of Botanical Interest.

*Aleurites montana* planted in 1925 produced several panicles of pretty white flowers in August followed by a few fruits for the first time.

Grafted mango (Dilpassand) planted in October, 1924, flowered in May for the first time but did not set fruit.

*Ar'ocarpus nobilis* var.—A variety of seeding bread-fruit planted in October, 1924, produced one fruit for the first t me. The fruit resembles an ordinary bread-fruit with large round seeds about the size of marbles which are roasted and eaten.

*Lodoicea Sechellarum* (Coco-de-mer). The hand pollination of the inflorescence has resulted in the setting of four large fruits with three bilobed nuts and a good many single ones.

### Miscellaneous.

The long-felt need of a residential bungalow for the Curator has been satisfied. The Public Works Department has completed the building of a tank with a capacity of 1,000 gallons on the highest spot near the nursery and connected it with 1½-in. pipe from a well (6 ft. in diameter and 12 feet in depth) sunk below the fruit garden, the well being fitted with a Ward's double-action pump. The distribution of water from the tank has been effected through distributing pipes of 1 in. and ½ in. laid to eight stands erected at suitable centres. The main entrance to the gardens was fitted with an ornamental cast iron gate turned out at the Government factory.

*Distinguished Visitors.*

The Rt. Hon. Mr. Ormsby Gore, M.P., Under-Secretary of State for the Colonies, visited the gardens on June 10, with His Excellency the Governor, Mr. H. Creasy, and Mr. E. M. W. Lloyd of the Empire Marketing Board. Dr. A. W. Hill, Director of Kew Gardens visited the Gardens on March 29, and His Royal Highness the Crown Prince of Belgium with His Excellency the Governor on December 9.

*Receipts.*

| | Rs. | c. |
|---|---|---|
| Amount credited to revenue from sale of plants, &c. .. .. | 324 | 25 |
| Amount credited to revenue under Head " Sundries " (Guide Books) .. | 23 | 0 |
| Amount credited to revenue through E. S. P. (rubber) .. .. | 2,159 | 11 |
| Amount credited to revenue through R. B. G. (rubber seed) .. .. | 1,349 | 63 |
| Total .. | 3,855 | 99 |
| Value of free issues to Goverment institutions.. .. .. | 126 | 30 |

*Rainfall for 1928.*

| Month. | 1928. Inches. | 1928. Days. | Average for last 37 years. Inches. | Average for last 37 years. Days. |
|---|---|---|---|---|
| January .. .. | 5·68 | 7 | 3·87 | 7 |
| February .. .. | 3·00 | 5 | 2·83 | 4 |
| March .. .. | 5·56 | 5 | 5·78 | 8 |
| April .. .. | 9·14 | 13 | 9·13 | 13 |
| May .. .. | 4·57 | 16 | 13·13 | 17 |
| June .. .. | 7·98 | 18 | 12·54 | 19 |
| July .. .. | 16·32 | 10 | 6·48 | 13 |
| August .. .. | 6·45 | 12 | 4·38 | 10 |
| September .. .. | 3·82 | 11 | 7·57 | 14 |
| October .. .. | 28·43 | 25 | 16·02 | 19 |
| November .. .. | 17·89 | 25 | 14·19 | 16 |
| December .. .. | 8·66 | 14 | 5·86 | 9 |
| | 117·50 | 161 | 101·78 | 149 |

THE GOVERNOR'S AND COLONIAL SECRETARY'S GARDENS.

*The Queen' House Gardens, Colombo.*—Routine operations have been carried out with regularity and several small improvements undertaken ; stocks of palms and ferns are being increased for house decoration and new tubs and pots purchased. In view of the pending structural alterations to the building more time and attention will become available early next year to work up these stocks.

*King's Pavilion Garden, Kandy.*—The upkeep here has been well maintained. All beds and borders have been thoroughly overhauled, manured, and dug. Improvements to the stables area have been completed. Operations in hand comprise the overhauling of the gardens frontage by the removal of all bamboos, now old and unsightly, the removal of the large overhanging inga saman trees and a complete relaying and planting of this area.

*The Temple Trees Garden, Colombo.*—These gardens have been much improved with the advent of the new head gardener and now present an attractive sight at all seasons. Special attention has been and is being given to all lawns with encouraging results. A new plant house has been erected and furnished, and the tennis court kept in good order. Propagation of a wide variety of garden subjects is being carried on also.

*The Lodge Garden, Kandy.*—All beds and borders have been regularly attended to and lawns kept in order. No new improvements of any scale have been undertaken since labour here is reduced to one cooly. The large *Amherstia* tree here was attacked by pink disease, but attention in the early stage eradicated this.

*The Queen's Cottage Garden, Nuwara Eliya.*—The Curator, Hakgala, reports as follows : The chief work during the year has been the removal of earth from the bank cut back by the Public Works Department for the building of the extension of the house. This earth was carted and used for raising the level of the old drive.

The tennis court was converted into a rose garden during December, when a large collection of rose plants imported from England was planted out. The terrace below the rose garden has been levelled and returfed. A new tennis court is at present being made on the grass slope above and to the north of pond No. 3. Most of the flower beds in front of the house have been turfed over and the fountain has been replaced by a large bed. A large border on the bank above pond No. 2 has been made and planted with Arums, Crinums, *Agapathus, Tritonia,* &c. A bank 8 ft. high and 200 ft. long and another 12 ft. by 240 ft. below the new rose garden and behind the servants' quarters have been made and turfed. All borders and beds were planted up during December with annuals &c. A good supply of vegetables has been kept up during the year.

*The Lodge Garden, Nuwara Eliya :* The Curator, Hakgala, reports as follows :—The ravine below the vegetable garden has been tidied up, all coarse weeds, stumps, &c., being removed and the area levelled off. The upper pond has been cleaned out and the surroundings tidied up. The rockery has been extended and planted up with suitable plants and the over-hanging branches of the *Cupressus* trees in the avenue have been lopped. The lawn at the back of the house has been remade under outside supervision. The oak tree on the lawn at the back of the house has been cut out. This tree was the finest specimen of its kind in Ceylon. The retaining wall in the vegetable garden has been extended by 15 ft. and 3 flights of steps have been built. All the beds and borders were manured and replanted towards the end of the year.

T. H. PARSONS,
Curator, Royal Botanic Gardens.

## HAKGALA BOTANIC GARDENS, REPORT FOR 1928.

### IMPROVEMENTS.

SEVERAL improvements have been carried out during the year, chief of these being the making of a drive to the laboratory and the levelling of the old cattle shed site on which are to be built the three greenhouses.

The area behind the storeroom has also been levelled for the building of the new potting shed and carpenter's shop. The path leading to the foreman's quarters on the right of this area has been remade and the sides of the stream have been built up with stones.

Several of the trees in the *Cupressus macrocarpa* avenue near the entrance gates have been removed, and a retaining wall 4 feet high has been built throughout the length of the avenue along the upper side of the drive. A smaller retaining wall 2 feet high is now being built along the base of the remaining trees, so that the bank above can be satisfactorily sloped and grassed.

The area between the lower garden path and the Badulla road has been cleared of all undergrowth, and the laying out of this portion of the gardens is to be undertaken as soon as labour is available. The lower boundary of the area is to be fenced with iron fencing which has been ordered from England.

The triangular border in front of the visitors' garage has been reduced in size, so that the whole of the garage can be used for the parking of cars.

### ROCK GARDEN.

2. This has been kept in good order during the year, and the trial of a number of new kinds of plants raised from imported seeds has been continued with encouraging results.

The Ceylon section has been given special attention during the year, and a large number of indigenous plants has been collected and planted out and labelled.

The underground drains under the lawn near the entrance have been renewed.

Both sections received a general overhaul during December when a large number of plants was put out.

Labels for use in the garden have been ordered from England and it is hoped to put these out during February.

Sambur have continued to do a great deal of damage throughout the year and *Nymphaea mexicana* in the ponds has been regularly eaten down.

### FERNERY.

3. The undergrowth in the area between the Fernery and the jungle has been cleared.

A good deal of planting has been done in the Ceylon section and the bridges over the streams have been rebuilt.

It is much regretted that owing to want of labour it is not at present possible to give the necessary attention to the proper upkeep of the Fernery.

### BULB GARDEN.

4. This garden received a general overhaul during November, when all the beds and borders were manured and replanted.

Twenty-five bulbs each of twelve kinds of daffodils, received from Messrs. Sutton & Sons, Reading, England, in exchange for seeds, were planted out early in November and are growing well.

Several kinds of *Kniphofia aloides*, raised from seeds, flowered towards the end of the year.

### FRUIT PLOTS.

5. Three plants each of *Diospyros Kaki*, "Twentieth Century" and "Delicious," were imported from the Yokohama Nursery, Japan, early in the year and have been grown in pots. They will be planted out in due course.

The citrus plants planted out in October, 1928, are not making much growth and the same remarks apply to the loquat plants put out in 1927.

Two of the grape fruit plants received from Peradeniya in 1925 have made fair growth, but have not yet flowered.

### GENERAL.

6. The bridges along the lower garden path have been rebuilt and the retaining walls of same put in good order.

The summer arbours have been repainted and the woodwork repaired.

The shrubberies have received attention throughout the year and a good deal of planting has been done.

The undergrowth in the *Eucalyptus* and *Pinus* plantations has been cleared and all trees in the former plantation have been labelled.

The weeding out of *Aristoea Eckloni* in all parts of the gardens has been regularly attended to.

The building of the seed beds and tank in the plant sheds was completed early in the year and we have now excellent accommodation for the propagation of plants.

The foreman's quarters have been put into good order by the Public Works Department, and the surroundings have been tidied up.

A large number of seedlings of *Cinchona Ledgeriana* and *Cinchona robusta*, raised from seed received from Java and Ootacamund, have been put into baskets and are to be distributed in due course.

Camphor.

7. Six suckers of *Cinnamomum Camphora* received from Mauritius were planted out between the camphor plantation and the nursery in September and are doing fairly well.

Fifteen layered plants of camphor, from five trees above the Rock Garden, were sent to Peradeniya in September for transmission to Mauritius.

Fodder Grass Trials.

8. The fodder grass trial plots were fenced early in the year to keep out sambur which were doing considerable damage to the various grasses, &c.

Seeds of the following eight fodders received from Australia were sown in January :—Rhodes Grass, Native Trefoil (Burr Clover), Japanese Millet, Cluster Clover, King Island Melilot, Broom Corn, Sudan Grass (Genuine Garawi) and *Paspalum dilatatum*. The seeds germinated well, but all the plants, with the exception of *Paspalum dilatatum*, died off during the dry weather experienced during February-April.

Owing to the unsatisfactory results obtained from trials of various kinds of fodders during the last two years, further experiments have been discontinued from October.

Sambhur.

9. Considerable damage has been done throughout the year by sambhur and a good boundary fence is urgently needed to keep out these animals.

In December alone, sambhur visited the gardens on twenty occasions.

Revenue.

10. The amount realized by sales of plants and seeds for the twelve months ended December 31 was Rs. 1,448·47, and for the twelve months ended September 30 Rs. 1,578·70.

The value of plants and seeds issued gratis or in exchange to Government institutions, &c., was Rs. 631·30 for the twelve months ended December 31.

Introductions.

11. Plants and seeds have been received from the following :—Messrs. J. J. Grullemans & Sons, Holland ; the Director, United States Department of Agriculture ; the Yokohama Nursery Co., Japan ; Mr. F. H. A. Booth, Sydenhurst, Chiddingfold, Surrey ; the Director of Agriculture, Mauritius ; the Director, Botanic Gardens, Glasgow ; Dr. Jindrich Suza, Bruno University, Kounicova ; Messrs. Sutton & Sons, Reading ; the Director, National Botanic Garden, Kirstenbosch, Cape ; the Curator, Botanic Gardens, Penang ; the Director of Agriculture, Ootacamund ; Messrs. Wilson & Johns, 70, Barrack street, Perth ; H. Correvon, Geneva, Switzerland ; Mr. W. C. Berridge, Norfolk Island ; Miss A. M. Beal, Leandoo, Lorne, Victoria, Australia ; Mrs. Alice Pappride, London ; the Director, Botanic Gardens, Singapore ; the Director, Royal Botanic Gardens, Kew ; Mr. G. F. Grove, Huntingtree, Halesowen, England ; the Secretary, Premier's Department, Perth, Australia ; the Division of Botany, Pretoria ; the Forest Service Exchange Bureau, Palestine Government ; Col. R. J. L. Ogilby, D.S.O., Moreton Hall, Warwick ; Lady Dorothy Birkett, Trabolgan, Whitegate, Co. Cork, Ireland ; and Mr. P. J. Wester, Bureau of Agriculture, Manila.

And from the following in the Island :—The Curator, Royal Botanic Gardens, Peradeniya ; Mr. A. M. MacNeill, Kirrimittia, Kadugannawa ; the Director of Agriculture, Peradeniya ; the Manager, Experiment Station, Peradeniya ; Mrs. L. M. Le Feuvre ; Mr. Maberley Byrde, Mutwagalla, Kiriella ; and Mr. F. L. Daniel, Borella.

Meteorological.

12. The number of inches of rain recorded during the year was 93·58 falling on 219 days, compared to 139·05 falling on 248 days during 1927.

The wettest month was January with 14·94 inches, and the driest month September with 1·61 inches.

The highest temperature in the sun's rays was 151·4 on December 20, compared to 154·1 on April 8 of the previous year.

The lowest temperature on the grass was 33·3 on February 17, compared to 40·5 on January 11, 1927.

JAMES J. NOCK,
Curator.

---

## NUWARA ELIYA GARDEN, REPORT FOR 1928.

The weeding out of the white weed (*Anaphalis brevifolia*) from the lawns has been continued during the year and all bad patches on the lawns have been dug up and returfed.

The shrubbery below the Park road has been given a good overhauling and a good deal of planting has been attended to.

The blue water lily, *Nymphaea stellata*, in the pond near the lodge has been regularly weeded and has now been practically eradicated. Clumps of *Nymphaea Mexicana* have been planted in this pond and are growing well.

A new summer arbour has been built by the Board of Improvement near the Jubilee Oak, to replace the old arbour which had become very dilapidated and dangerous.

The banks below the new arbour have been sloped and turfed.

The summer arbour on the lawn above the pond has been repaired and put into good order.

Over two hundred plants of Cupressus supplied from Hakgala have been planted out to fill gaps in the hedge along the road between the Post Office and Memorial Corner.

A good fence with concrete posts has been erected along the Park road by the Board of Improvement.

JAMES J. NOCK,
Curator.